6 simple steps to savings via a Rubber Railroad Crossing

1 Nail framed risers to top of ties – to hold rubber-cushioned pads at proper height for years of smooth, quiet, maintenance-free crossing despite hard use in heavy traffic.

2 Force steel-backed rubber center pads into place over risers – their sealing lips fitting tightly against both rails for permanent, watertight, weatherproof installation.

3 Drill lag screw holes through center pads and risers into ties–providing a means of firmly anchoring the pads through year after year of heavy rail and road traffic.

4 Anchor side pads – also with lag screws–through risers into ties. They, too, form a maintenance-saving waterproof seal against the rails.

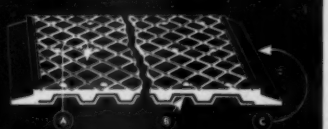
5 Insert rubber plugs into all the countersunk screw holes – a permanent barrier against seepage that might rot ties or foul ballast.

6

GOODYEAR INDUSTRIAL PRODUCTS

G.T.M.-Specified

Molded Rubber Railroad Crossing Pads



A Thick pad of solid, tough stock for excellent resistance to cutting, wear, weather and low temperatures

B Heavy-gauge steel plate reinforcement follows contour of corrugated pad bottom

C Tough integral flanges seal tightly against tracks when pad is sprung into place

It's easy to see why the G.T.M. – Goodyear Technical Man–recommends Rubber Railroad Crossings for interplant use – especially for handling spillables or breakables. Not only is their installation easy, but they don't splinter like wood–crumble like concrete–soften up or rut like asphalt. In fact, after years of hard use, they've proved virtually maintenance-free.

For the complete story, write Goodyear, Industrial Products Division, St. Marys, Ohio, Los Angeles 54, California, or Akron 16, Ohio.

RUBBER RAILROAD CROSSINGS BY

GOODYEAR

THE GREATEST NAME IN RUBBER

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'ROUND ABOUT

with the editors in field and office

Edited by R. L. Marinello

Appointment at Allis-Chalmers

William R. Elms has been named an assistant engineer in Allis-Chalmers Manufacturing Company's plant engineering department, Milwaukee, Wisconsin.

Elms is a mechanical engineering graduate of Purdue University and received his master's degree in business administration from the University of Pennsylvania. He recently completed Allis-Chalmers' training course for graduate engineers.

Foundry Maintenance Session

GOOD FOUNDRY maintenance procedures and techniques will be discussed at the two-day conference, scheduled for June 2 and 3, at the University of Wisconsin Extension Division, Madison, Wis.

Among the topics to be presented will be: recent developments in maintenance of material handling, melting, compressed air, and heat-treating equipment, and effectively administering the foundry maintenance function.

Plant engineers planning to attend this conference can get more particulars from Engineering Institutes, 3030 Stadium University Extension Division, The University of Wisconsin, Madison 6, Wisconsin. The conference is identified by the title: Foundry Maintenance and Management. Fee for the conference is $20.00.

Industrial Water Conservation

A SHORT COURSE on industrial water conservation is being conducted by the University of Michigan on June 8 and 9. The purpose is to supply possible answers to the question ". . . just what is being done and what can be done by industry to cut down on its use of water . . ."

The course, designed to serve plant engineers, will discuss such subjects as: Where do we get our water and how much have we? Elements of water management. Conducting a plant survey. Site selection. Water conservation efforts in various industries; i.e.

Vern Kempf Presents Talk on Industrial Lighting

GREEN AND RED golf balls, nuts and bolts and a flashlight are some of the familiar items used by Vern Kempf, Electrical Editor, PLANT ENGINEERING, as props in his talk on Industrial Lighting. He recently gave the talk for 16 plant engineers of the Fox Valley Chapter of the AIPE during their monthly meeting at the Baker Hotel in St. Charles, Illinois.

His talk covers such subjects as the science of seeing, design of lighting systems, cost of lighting and lighting maintenance. Slides used show some of the latest applications of good practices in industrial lighting.

Vern presents such subjects as the science of seeing, design of lighting systems and lighting maintenance to the members of the Fox Valley Chapter of the AIPE.

Subscriptions: U.S.A. $10, Canada $11. Other countries $12 per year. Single copies $1. Change of address: Send to PLANT ENGINEERING, Circulation Division, Barrington, Illinois. Please supply position title, company name, company address. Request must reach us by the 15th of month to make the change effective with following month's issue. Published monthly and accepted as controlled circulation publication at Chicago, Ill.

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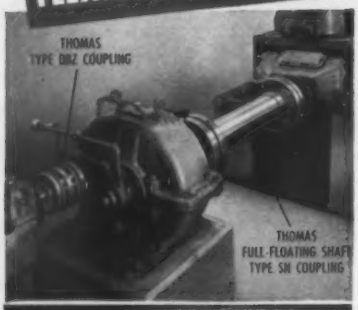

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'ROUND ABOUT

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Plant engineers interested in more information should address their inquiry to H. E. Miller, Director, Continued Education Service, School of Public Health, University of Michigan, Ann Arbor, Michigan.

Plant Engineer Promoted

Walter L. Nowacki was recently appointed division engineer of Kroger Company's Chicago Division. He will be responsible for the maintenance, construction and engineering of the facilities for the Chicago Division.

He graduated from Iowa State College with a degree in mechanical engineering. He has attended post graduate studies at Purdue University Extension in industrial management. He is a registered professional engineer in the states of Indiana and Illinois.

Some of his outside activities include being the Commanding Officer of the Disaster Relief Team of the Lake County area. He is also the President of the Calumet Chapter of the American Institute of Plant Engineers.

Three Paint Seminars

NOT ONE, not two but three short courses on paints and protective coatings will be presented at the University of Missouri. Exact dates and course are given below.

Maintenance Coatings Short Course —June 8 to 12—Program: Relation of building blocks to properties and performance of coatings. Proper selection, use and performance of maintenance coatings. Theories and types of corrosion. Organization of a painting program. Rollers for every painting purpose.

Paint Short Course for Beginners—July 6 to 17—Program: Twenty lectures covering: Chemistry, modifications and usage of drying oils. Composition, properties and usage of solvents, thinners and driers. Principles of paint and varnish formulations. Also ten laboratory sessions on determination of color and viscosity of oils, etc.

Advanced Paint and Polymer Refresher Course—July 20 to 31—Program: Organic and physical chemistry of polymers. Chemistry of hard coating resins, C-oil and Butoxy resins.

Further information and registration blanks may be obtained from Dr. Wouter Bosch, Missouri School of Mines, Rolla, Missouri.

How Much Light Is Right?

TEN NATIONAL organizations will sponsor a Building Research Institute Conference on Building Illumination. on May 20 and 21, to see if they can find an answer to this question. The conference will be held at the Statler-Hilton Hotel in Cleveland, Ohio.

The program was planned for an exchange of ideas and opinions among all factions of the building industry and its related professions, with a view to arriving at conclusions about lighting for tomorrow's buildings that would reflect the needs of all concerned.

Complete program information and registration may be obtained from Harold Horowitz, Technical Secretary, Building Research Institute, 2101 Constitution Ave., Washington 25, D. C.

Home Study Course on Welding

FIFTEEN WELDING authorities contributed educational material for this home study course on Arc Welding.

The course covers all forms of the arc welding process. Subjects in the home-study and in-plant training course include fundamentals such as weldability, power supply and equipment, consumable and non-consumable electrodes, mechanical properties, design, quality control and other topics. Techniques and applications in high alloy steels, copper and its alloys, and nickel alloys are also discussed.

Detailed course information may be secured from the Metals Engineering Institute, American Society of Metals, 7301 Euclid Ave., Dept. NR-3, Cleveland 3, Ohio.

Sharpen Your Garden Tools

INDUSTRIAL LANDSCAPING must be on the minds of a lot of plant gardeners right now. While you are placing your order for the tools, seeds and plants you'll be needing, why not plan now on entering this year's Industrial Landscaping competition.

Entries must be received by the American Association of Nurserymen by September, 1959. A folder describing the awards, containing entry procedure and a list of past winners may be obtained by writing to Dr. Richard P. White, American Association of Nurserymen, 635 Southern Building. Washington, D. C.

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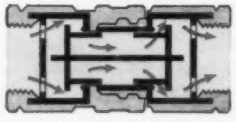

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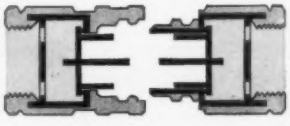

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Snap-Tite valved couplings are available with two-way or one-way automatic line shut-off. They are normally furnished in alloy steel. Also available in brass, aluminum, or stainless steel with a variety of finishes.

Write for Snap-Tite Catalog No. 58 for more information on Snap-Tite valved couplings.

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May, 1959

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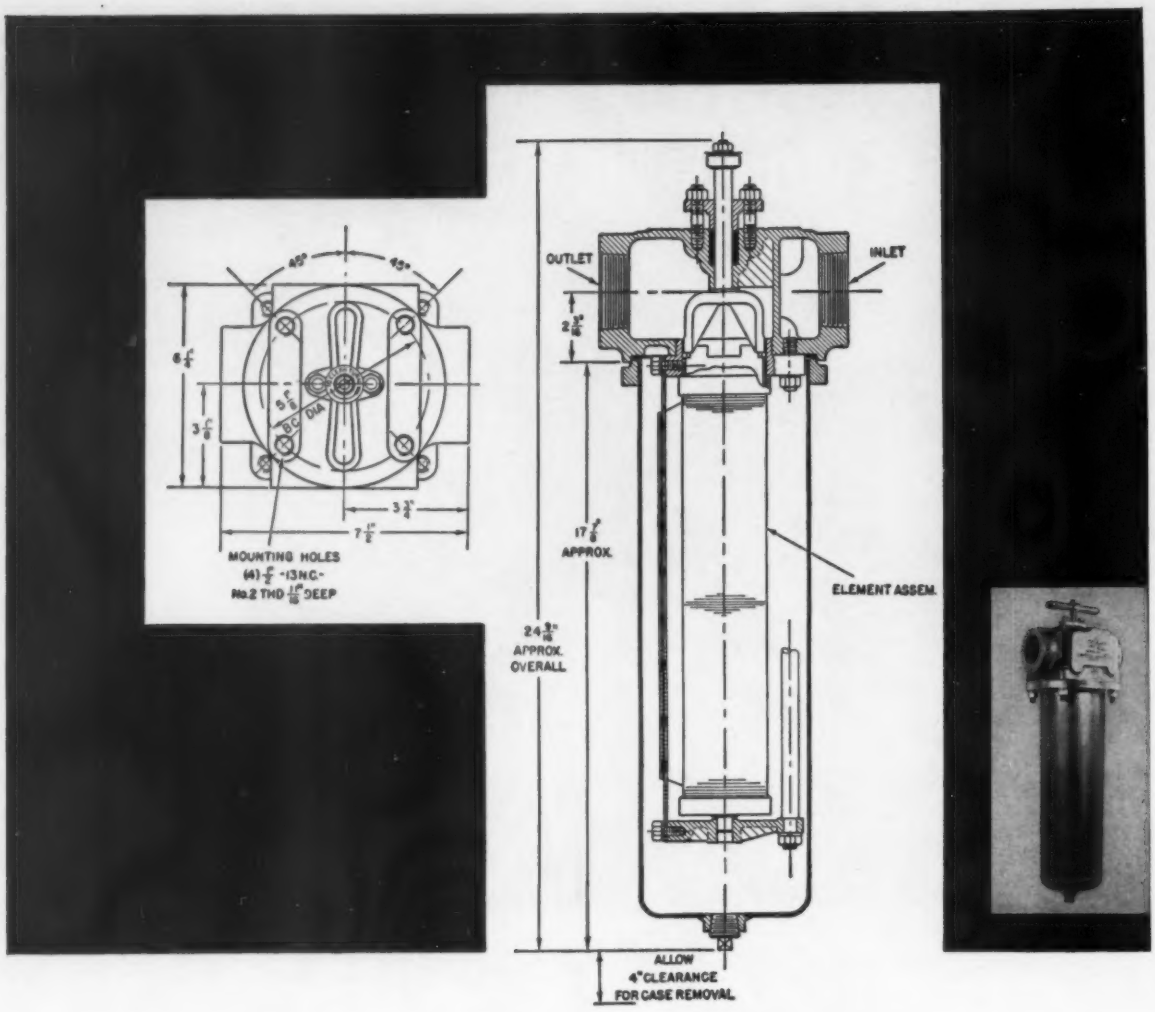

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SPECIFICATIONS: This Purolator filter model G-141J—is designed for filtration in a range upward of 40 microns.

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It is recommended for capacities of from 6 to 200 GPM, dependent on viscosity. Spacing varies from .0010 to .020.

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Maximum pressure: 125 PSI; weight: 37 lbs. Equipped with simplex full-flow metal element oil strainers.

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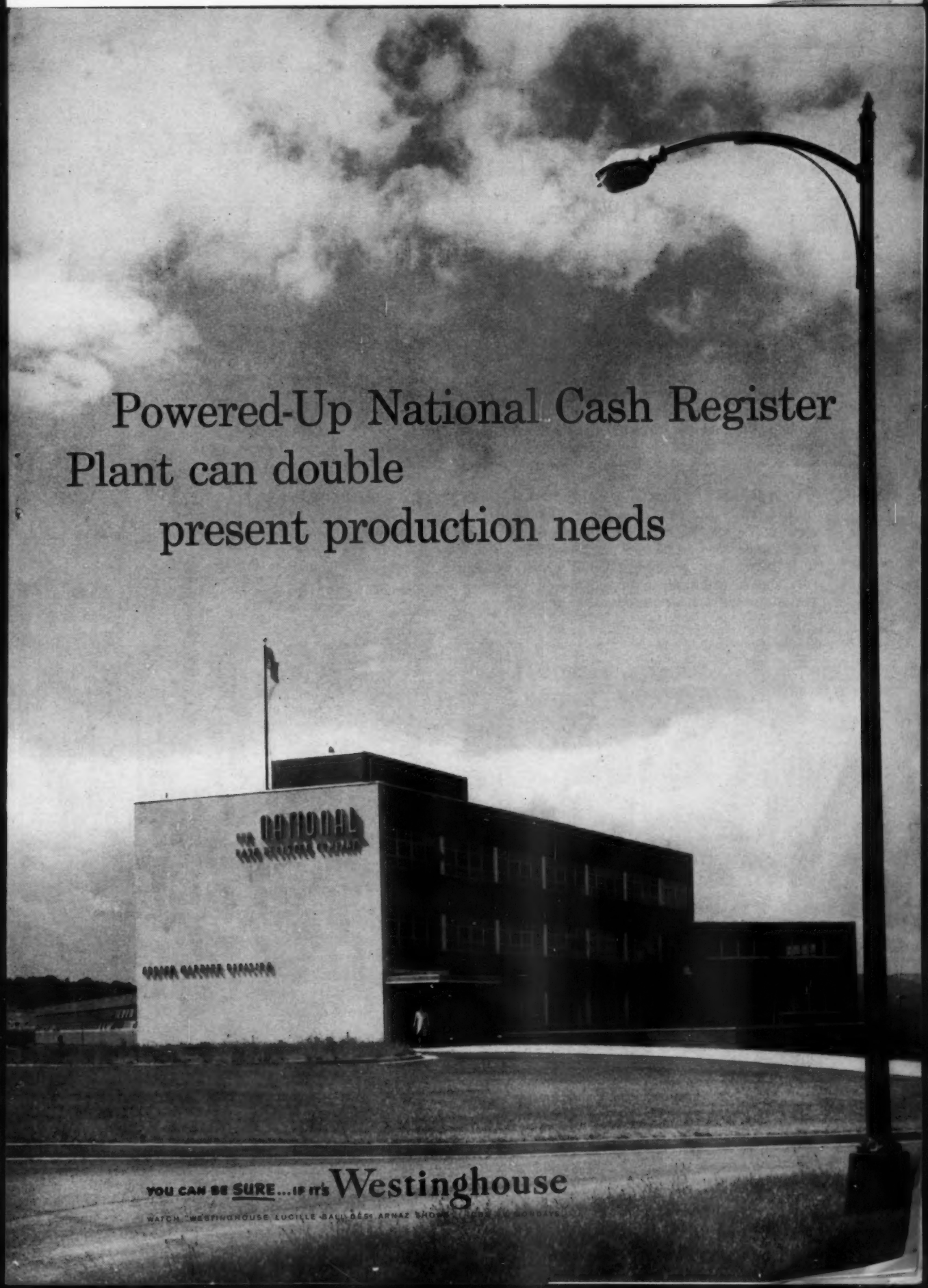
Cover photo — Top: New National Cash Register Co. Adding Machine Division


Powered-Up National Cash Register
Plant can double
present production needs
YOU CAN BE SURE...IF IT'S Westinghouse

Cover photo — Top: New National Cash Register Co. Adding Machine Division Plant, in Ithaca, New York. Westinghouse Type OV-20 outdoor lighting is used for the building approach and parking area.

New adding machine plant has 50% reserve electrical capacity

When the Ithaca, N. Y., Adding Machine Division of The National Cash Register Co. found its existing plant inadequate, a new plant site was secured. The design and planning for the new plant provided more efficient production methods and future plant expansion as required.

Once space requirements were satisfied, electrical power needs were detailed. An all-Westinghouse electrical distribution system was specified to meet these needs. A 2000/2300-kva, double-ended power center, located near the middle of the manufacturing area, feeds ten runs of plug-in bus duct which distribute low-voltage power throughout the plant. Six runs of 600-amp, three-pole plug-in duct are used for 480-v distribution, while four runs of 600-amp, four-pole duct supply 277 wye/480 v for both lighting and power requirements. Use of Westinghouse plug-in bus duct provides a flexible, efficient system which can be easily adapted to any changes in the automated adding machine production line.

The new Ithaca plant has 50% more electrical capacity than is required by present production needs. The new 146-acre site (as compared to the previous six acres) is ample for anticipated space requirements, while the electrical system capacity can be doubled simply by utilizing the provisions for expansion and the spare equipment now installed. An interesting example of the new plant's expansion possibilities is that the present plant structure can be extended 600 more feet to the back. The location of the installed power centers will allow any necessary new feeders to be installed with minimum distance and voltage drop. In some cases, present bus duct runs can be extended into the new area.

Westinghouse worked closely with the architect, consulting engineer, general contractor, electrical

(continued)

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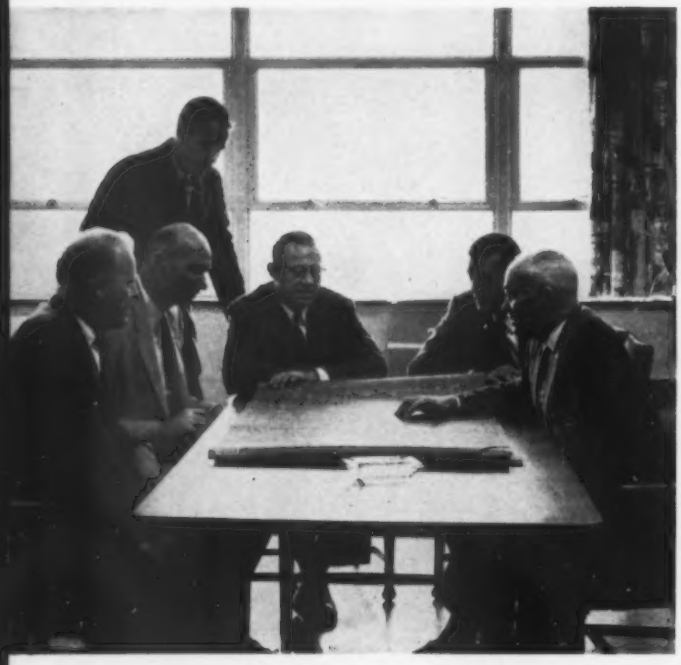
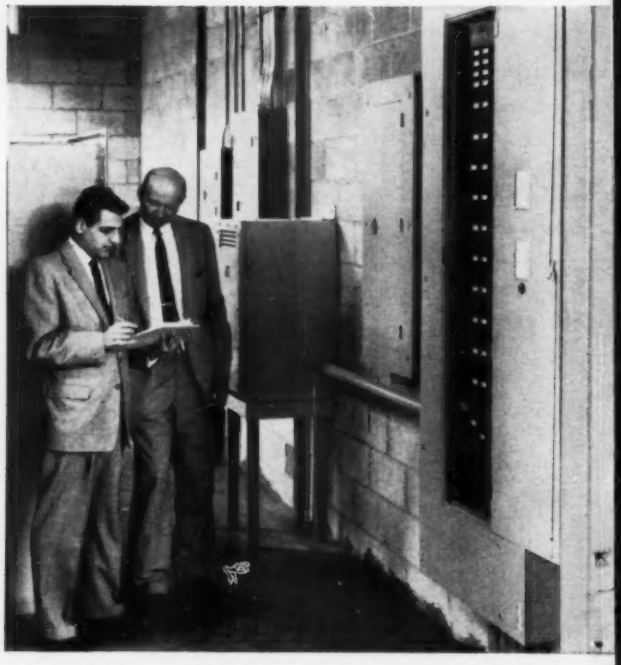


Conference room discussion includes Charles T. Hansen, Westinghouse Sales Engineer; John M. Schweiger, Schweiger, Heapy & Associates, Consulting Engineers; James Miller, Westinghouse Construction Sales Engineer; Clair Dean, Buffalo Electric Co., Electrical Contractors and Westinghouse Distributor; Ed Likens, Professional Engineer, Lorenz & Williams, Architects and Engineers; and C. W. Vail, Plant Engineer, Adding Machine Division of The National Cash Register Co., Ithaca, N. Y.

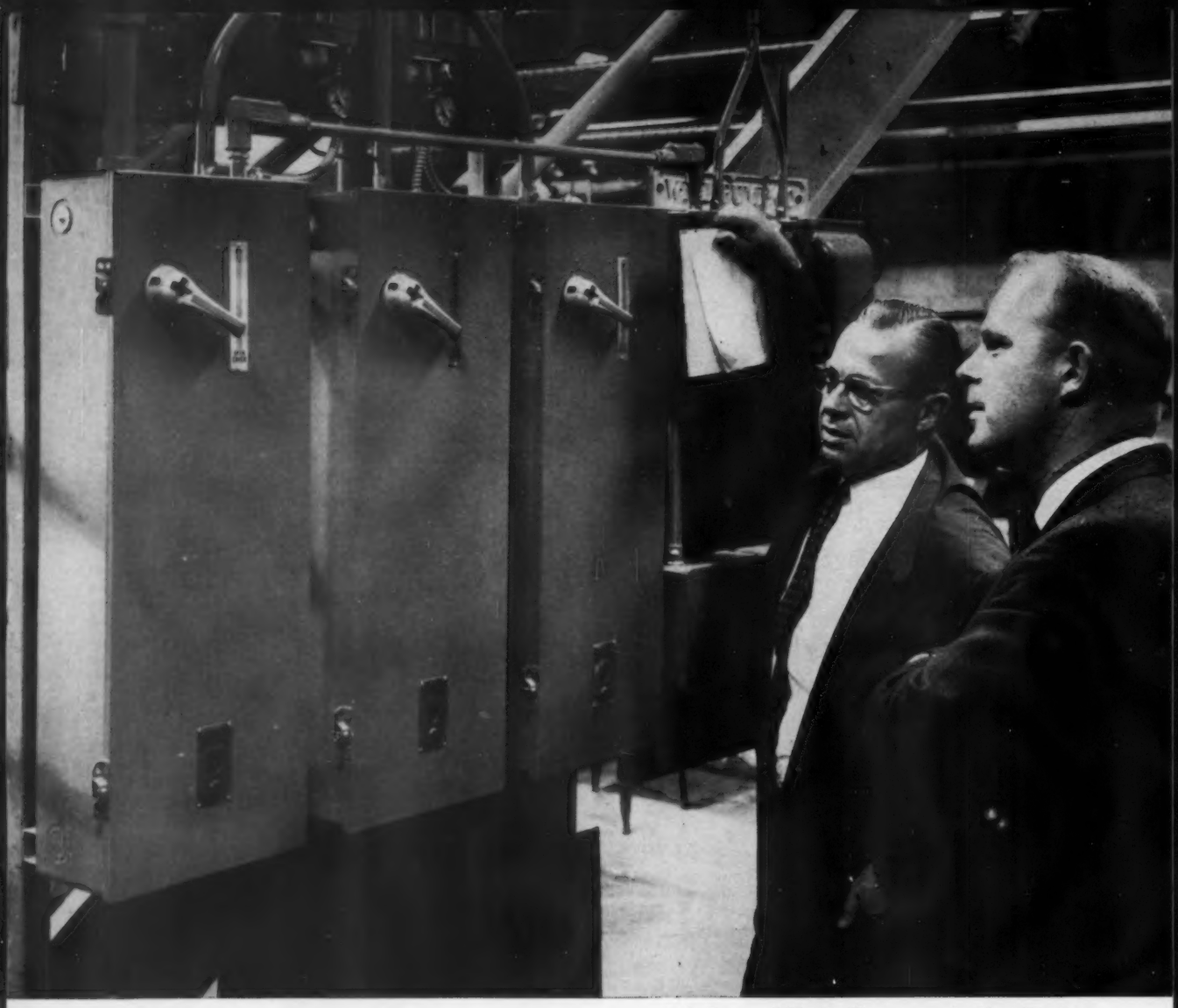


J. Victor Bagnardi, Ithaca representative of Lorenz & Williams, and John M. Schweiger are shown in electrical equipment room. On wall facing them can be seen four Westinghouse panelboards and a Westinghouse 50-kva, 480-v primary to 120/240-v secondary, single-phase, DS-3, dry-type transformer. Two of the panelboards are NLAB 120/240v, one is a NHIB 277/480v, and the opened panelboard in the foreground is a CDP 277/480v. J-94087-2

General plant view shows multiple runs of Westinghouse 2WVO-40R, 277-v fluorescent lighting and 600-amp copper plug-in bus duct. Plug-in units shown are circuit breaker type. Plug-in bus duct and circuit breaker plug-in units are standard requirements in The National Cash Register manufacturing plants.

Clair Dean, John Schweiger and C. W. Vail discuss details of Westinghouse 2000-kva, double-ended (one 1000-kva Inerteen® transformer each end) power center. Incoming voltage of 4800 is reduced to 480 wye/277. Each transformer has provision for 150 additional kva, so only fans need to be added when increased rating is needed. Four spare DB breakers are installed in board to take care of future load and, in addition, four cells are equipped to receive breakers when needed. (Note new switchgear design with three-position DB circuit breakers. Visible positioning tells at a glance if breaker is in "ON," "TEST" or "OFF" position. New "TEST" position allows testing of breaker in switchgear cell with complete safety.)

J-94087-3



Clair Dean and Charles Hansen examine three Westinghouse Class 11-204 nonreversing combination Life-Line® starters which provide control and overload protection for the motors in the equipment room.

50% reserve electrical capacity *(continued)*

contractor and The National Cash Register Co. engineers in selecting the equipment which provides for present and future electrical needs. Westinghouse can also help you with any of your electrical planning and construction requirements. See your Westinghouse distributor, or write: Westinghouse Electric Corporation, Box 868, Pittsburgh 30, Pa.

J-94087-4

Owner: The National Cash Register Co., Dayton, Ohio

Architect: Lorenz & Williams, Architects and Engineers, Dayton, Ohio

Consulting Engineer: Schweiger, Heapy & Associates, Dayton, Ohio

General Contractor: Streeter Associates, Inc., Elmira, N. Y.

Electrical Contractor: Buffalo Electric Co., Inc., Buffalo, N. Y.

Westinghouse Distributor: Buffalo Electric Co., Inc., Buffalo, N. Y.

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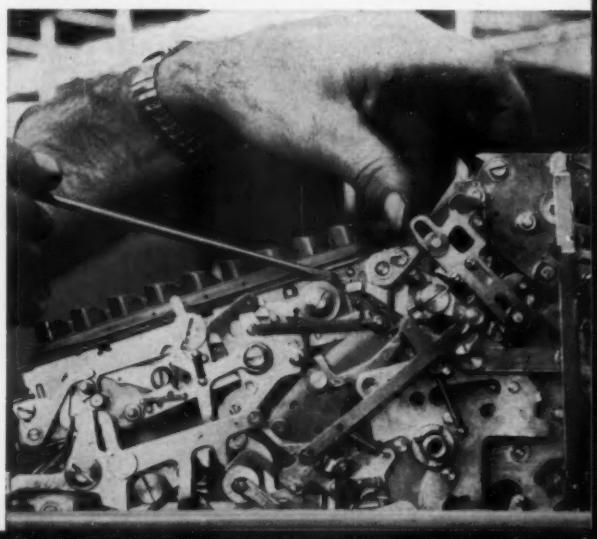
Close-up view of adding machine mechanism as manufactured in Adding Machine Division of The National Cash Register Co.



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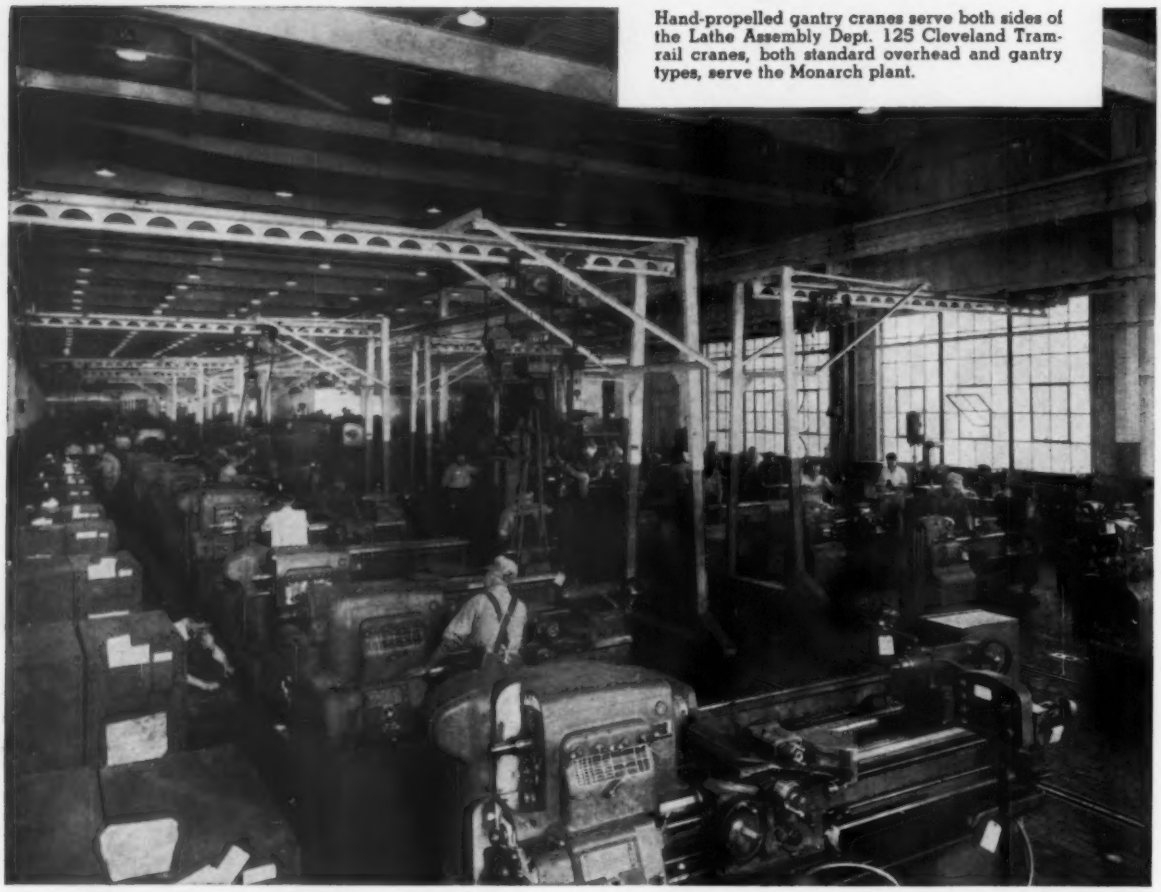
One Crane for Every 6 Production Workers



Hand-propelled gantry cranes serve both sides of the Lathe Assembly Dept. 125 Cleveland Tramrail cranes, both standard overhead and gantry types, serve the Monarch plant.

EVERY manufacturer recognizes the need of mechanical handling equipment for hoisting and moving parts weighing hundreds of pounds, but not so many appreciate the value of cranes for handling parts that are within a man's ability to lift.

The Monarch Machine Tool Company, Sidney, Ohio, the world's largest exclusive manufacturer of lathes, made a thorough study of the effects of heavy manual lifting. They found that parts weighing only 50 or 75 pounds can be the cause of smashed fingers, hernias, and other injuries. When such parts must be handled numerous times a day, worker fatigue becomes a serious problem and affects not only production but workmanship.

Cleveland Tramrail cranes have proven to be the solution to the problem. For more than 15 years Monarch has been using Cleveland Tramrail equipment and today has 125 cranes of the standard overhead and gantry types which provide handling service throughout its fine modern plant. The importance attached to cranes here is attested by the fact that one crane is provided for every six production workers on the job at any one time.

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CLEVELAND TRAMRAIL

Overhead Materials Handling Equipment

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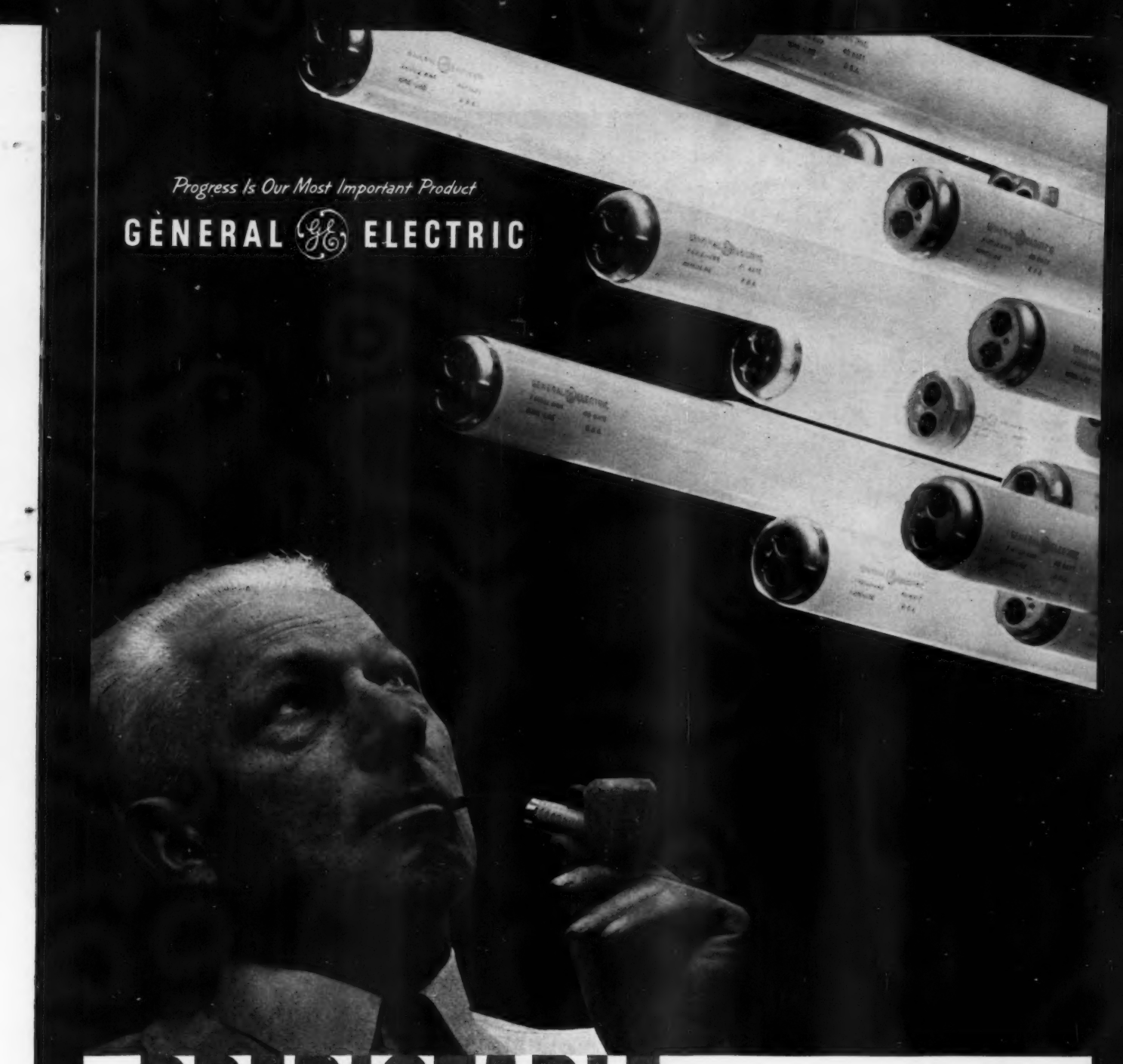

PREDICTABLE

"A growing number of companies like ours group relamp. We start off each department with new lamps —and, just before they begin burning out at a rapid rate, we replace the whole set, rather than burnout by burnout. But to make group relamping *really work*, we need the *predictable performance* of General Electric Lamps. Otherwise I have department heads climbing all over me because a maintenance man is climbing all over them to replace early burnouts.

"Only G-E Lamps give us the predictable performance we need to make group relamping practical. On the average, 99 out of 100 will still be burning after almost two years of service. So we aren't bothered by early burnouts—and we get more light for our money."

If you'd like more information on group relamping with predictable G-E Lamps, write: General Electric Co., Large Lamp Dept. C-921, Nela Park, Cleveland 12, O.

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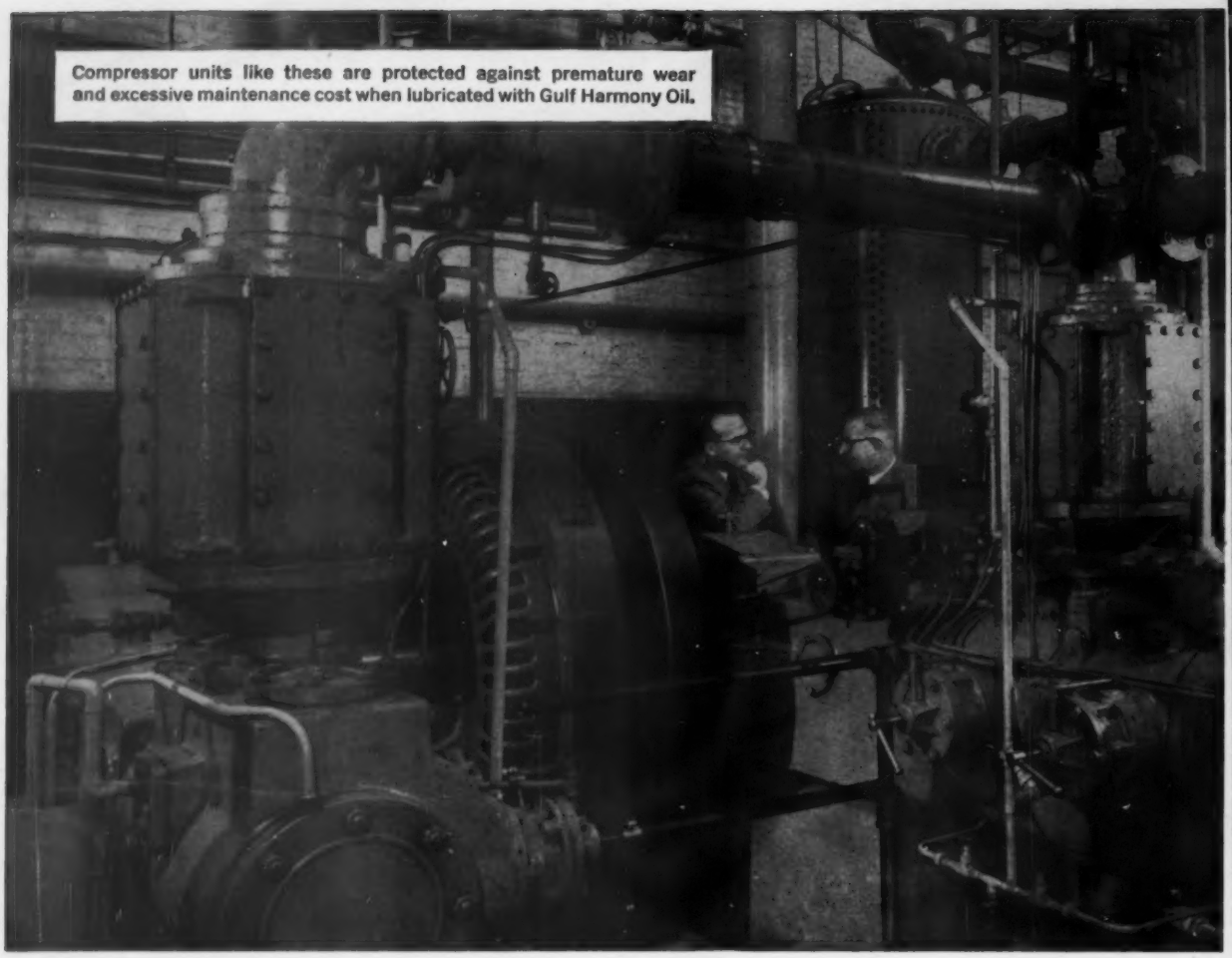


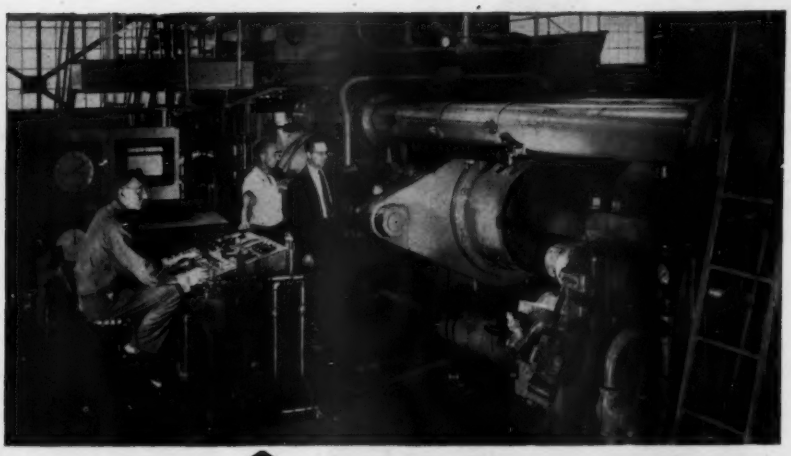
Compressor units like these are protected against premature wear and excessive maintenance cost when lubricated with Gulf Harmony Oil.

Gulf makes things run better with outstanding multi-purpose

NEW AND IMPROVED

Gulf Harmony, a long-time favorite multi-purpose oil, is now further improved to serve you even better. Here are a few of the improved Harmony's many advantages:

- Higher oxidation resistance assures longer life and freedom from harmful sludge deposits.
- Retains its original viscosity over longer periods of time.
- Maintains its color stability longer.
- Anti-corrosion additive protects against rust.
- Patented anti-foam agent prevents objectionable foaming.
- Performs exceptionally well in bearings exposed to high ambient temperatures and humid atmospheres.



New and improved Gulf Harmony Oil is setting new standards of performance in heavy equipment like this 3000-ton extrusion press.

Hydraulic stamping presses require an oil that has high resistance to oxidation, good rust preventive qualities and anti-foam properties. Gulf Harmony Oil is ideal for this type of service.

industrial lubricating oil . . .

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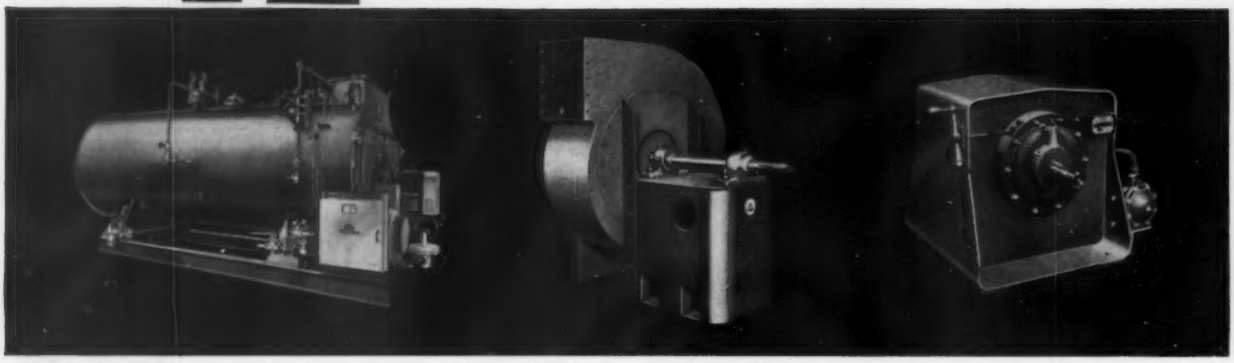

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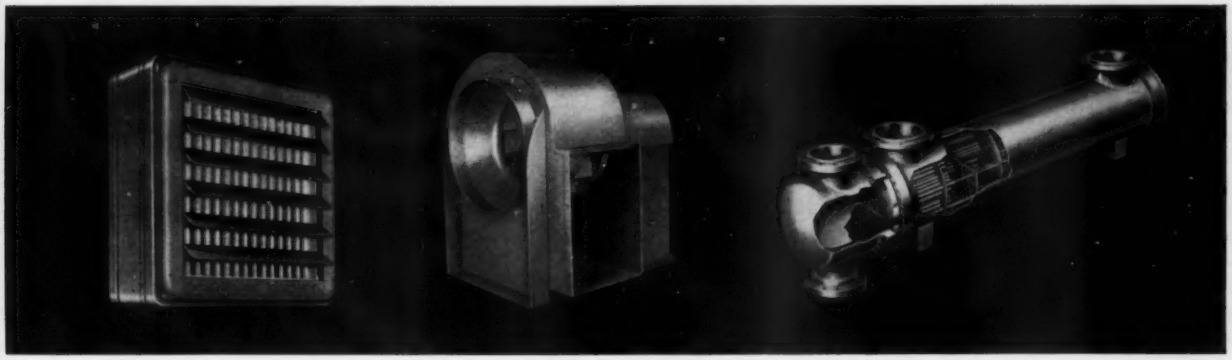

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HELPFUL WATER CONDITIONING DATA FROM BETZ

WHAT TO DO ABOUT SLIME

Biological fouling is a serious problem in cooling water systems. This helpful discussion reviews the problem and tells what to do about it.

BIOLOGICAL fouling in cooling water systems is the result of excessive growth and development of slime and algae. The principal difference between the two is that algae are capable of manufacturing their own food; fungi cannot.

Algae commonly are found in all surface water supplies. They range in size from unicellular microscopic plants to plants of more than one hundred feet in length. Although these plants are found usually in fresh and salt water, a few species are terrestrial. The species which are of primary importance in cooling water systems are the microscopic fresh water types, however, under unusual conditions the larger marine types also may become an industrial menace.

Because sunlight is necessary for the growth and development of these plants, recirculating cooling water systems are plagued with the problem of algal growths to a greater extent than once-through systems where the cooling water is not usually exposed to direct light. Abundant algal growths in spray ponds and in cooling towers will interfere with proper water distribution and thus prevent the desired cooling effect. Large masses of algae will plug screens and restrict flow in pipelines and pumps. Living algae in the presence of sunlight carry on processes of photosynthesis which result in the manufacture of food and the liberation of oxygen. Masses of living algae on metal surfaces can accelerate corrosion in the form of pitting because of the depolarizing action of the oxygen released. Accumulations of dead algae lodged in heat exchange units also can set up local cell action which can cause severe pitting of the metal.

Slime is an accumulation of microorganisms and whatever inorganic and/or organic debris may become embedded in the mass. The microorganisms usually found in these deposits are members of the filamentous fungi, yeasts, and bacteria. Slime also may contain dead algae which have been entrapped in the mass. In general, dark areas or those of low light intensity are more favorable for this type of biological fouling. The microorganisms do not utilize light to manufacture their food, being totally dependent upon the food available in the cooling water system.

The most common varieties of bacteria and fungi found in cooling systems are the air-borne types. The slime forming bacteria have a gelatinous capsule which not only serves to entrap other materials which add to its bulk, but also serves to protect the bacteria against the action of chemical and physical agents.

Chlorine

Chlorine is probably the agent most widely used for control of microbiological deposits in recirculating systems. In the absence of substances which cause a high chlorine demand, chlorine is usually the most economical method of treatment. It is highly toxic and acts quickly to kill bacteria. A chlorine residual of 0.5-1.0 ppm will usually destroy most microorganisms.

However, the amount of chlorine required for the control of biological fouling in any individual system is governed by numerous factors. Chlorine requirements are affected by the quality of the makeup water to the system, water temperatures in the system, air to water ratio of the system, the amount of contamination by reducing agents and the type and amount of bacterial and fungal contamination.

For control of the slime and algae problem in any system, it is necessary that sufficient chlorine be fed to secure the required residual chlorine content of the treated water. Further, this necessary chlorine residual must be maintained in the system for the time interval required for microorganism control.

Chlorinated Phenols

Many phenolic materials and particularly the chlorinated phenols have found use in industrial microbiological control. The toxicity of these materials varies widely between different species of bacteria and fungi.

The chlorinated phenols which have been most widely used in recirculating cooling water systems are the sodium salts of trichlorophenol and pentachlorophenol. Sodium pentachlorophenate is probably in most widespread use either alone or combined in commercial formulations with sodium trichlorophenate. Sodium pentachlorophenate is a soluble and stable material. It does not react with most inorganic or organic chemicals which may contaminate a cooling water system. A broader spectrum of biological activity can be achieved by the use of more than one chlorinated phenolic compound. For example, the simultaneous use of a trichlorophenate with a pentachlorophenate. Additional benefits may be gained by the combined use of metallic ions such as copper and zinc. Where a concentration of 200 ppm of a single phenolic compound may be required for satisfactory control of organic growths, combinations of this type have been successful in the range of 60-100 ppm.

Betz laboratory screening program determines whether a formulation has the desired biological activity.

With the chlorinated phenols, like chlorination, there are many different feeding programs that can be employed, ranging on the one hand from the continuous maintenance of a high concentration in the circulating water to the

other extreme of intermittent addition of the material in low concentration at infrequent intervals. As with chlorination, the slime control program must be fitted to the individual system conditions.

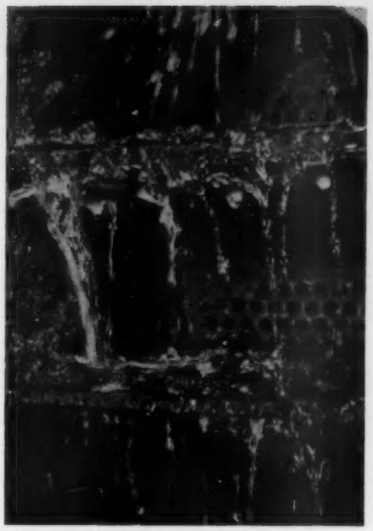
Selecting Slime Control Agents

A major factor in the decision whether to use chlorine or another slime control agent is usually made by balancing continuous chemical operating cost against equipment installation and maintenance costs.

Where liquid chlorine can be used, chemical cost will usually be lower than with other toxicants if chlorine is purchased in the larger one ton containers or tank cars, at their lower price. However, the installation cost of chlorinators and facilities for handling bulk chlorine shipments is quite appreciable. Maintenance of this equipment is an added cost.

On the other hand, other slime control agents are usually furnished in readily handled containers in liquid, powder or briquette form. Usually feeding facilities are not required when the toxicant is shot fed at infrequent intervals. Therefore continuous attention to feeding equipment is not necessary and there is no installation cost to be capitalized.

Where the system is sufficiently large and the problem sufficiently acute, the installation and maintenance expense of chlorination facilities will be justified. Where the cooling water system is relatively small or where there is only infrequent necessity for slime control agents, it will be more economical and convenient to employ agents other than chlorine. Even where the control of biological growths is handled normally by the use of chlorine, there will frequently exist the need of additional slime control agents. For example, during periods of contamination of the cooling water by reducing agents, chlorination facilities may be inadequate for the quantity of chlorine required under these circumstances.



Heavy slime formation in heat exchanger.

Addition of agents such as the chlorinated phenols or the various commercial combinations, may be necessary to control organic growths during such periods. Even where the increased chlorine dosage can be handled by the feeding equipment installed, it may be more economical to use another slime control agent at such times rather than to employ the greatly increased amounts of chlorine required during periods of contamination.

At the present time, there is no single toxic agent which is completely effective for the control of biological fouling in all types of industrial cooling water systems. There are faults inherent in all of the toxicants in common use. Chlorine is highly effective and rapid in bactericidal action, but chlorine consumption is greatly increased by the presence of reducing agents.

In addition, chlorine residuals can and often do have an adverse effect on cooling tower wood—particularly when residuals on the order of 1 ppm or higher must be maintained. Chlorine reacts with the lignin components of the wood and produces a bleached, fibrous surface. The cascading water readily washes away the weakened surface layers of the wood. With time the wood becomes thin and loses much of its strength. There is evidence that towers that use chlorine alone for slime control are more susceptible to fungus attack of the wood. Extensive damage from fungus attack is not uncommon and has been responsible for costly tower repairs and maintenance.

The chlorinated phenols and other materials may present a problem of fish toxicity in the blowdown discharge. Copper salts are more specific to algae than to bacteria and are rendered ineffective by precipitation at higher pH values. Quaternaries are affected by ions and organic matter.

All of these chemical agents are not equally economical and efficient. Selection of toxicants must be based on the microbiological complex encountered. Frequently, more than one toxicant is desirable to control, for example, both a bacteriological slime and/or algae problem. Methods and frequency of chemical feeding must be varied to suit the individual problem. Slime control agents vary in the rapidity of their action and must be selected with a knowledge of the retention period in the system. Compatibility of the toxicant must be studied in relation to other treatments used for scale and corrosion control. Local conditions governing discharge of blowdown water from the cooling system must be considered. Selection of the proper method of control of microorganisms in cooling water systems requires evaluation of numerous factors.

AND ALGAE

A complete and detailed study of biological fouling in recirculating cooling water systems is available in Betz Technical Paper No. 134A. We will be pleased to send you a copy.

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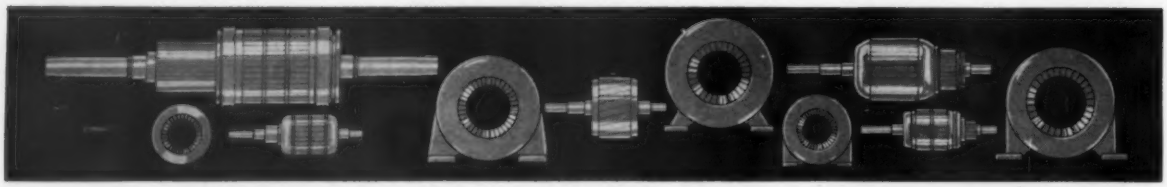

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BULLETINS just released and of immediate plant interest

On pages 235-236 are two postage-free Reader Service Cards provided for your convenience in ordering these bulletins. You may also use the cards to order any literature mentioned in ads.

MATERIALS HANDLING

101 Roller, Wheel Conveyors—Catalog 158 contains 68 pp of comprehensive data on roller and wheel conveyors for a variety of applications. Profusely illustrated with dimensional diagrams and photos of typical installations, catalog also gives detailed load rating tables, specifications. Mathews Conveyor Co.

102 Conveyor Equipment—Catalog 600 contains 46 pp of detailed information on conveyor equipment, including an automatic elevator for handling small parts magnetically, a totally enclosed bulk material conveyor featuring two-directional chain, a piano hinge steel belt conveyor elevator with press made components, piano hinge steel belt conveyor, steel belt and vibrating types, others. Prab Conveyors, Inc.

103 Pneumatic Conveying—Described in Bulletin 211 is a compact pneumatic conveying system for car, truck or bin unloading. Illustrates and describes each component, including vacuum nozzle, products collector, blower, airlock feeder. Includes schematic drawing of typical system, dimensions and specifications. Sprout, Waldron & Co., Inc.

104 For Materials Handling—Specifications and illustrations on two-wheel trucks dollies, wagon trucks, platform and shelf trucks, and many styles of casters, jacks and semi-live skids are given in 12-pp Bulletin 59G. Also included are specifications on demountable rubber tired, plastic, and pneumatic wheels. Nutting Truck and Caster Co.

105 Truck Selector Guide—This 20-pp Industrial Trucks Selector Guide is designed to aid in setting up new or revising present system. Factors such as capacity, frequency of use, power source and use of semi-standard or special trucks are given, and individual specifications and features about each model are included. Automatic Transportation Co.

106 Narrow Aisle Solutions—Recent 16-pp issue of the "Lever" describes new developments and use of 24 narrow aisle equipment to solve a variety of materials handling problems. Other articles cover a variety of powered equipment for industry. Lewis-Shepard Products, Inc.

107 For Material Handling—This loose-leaf type catalog contains detailed information on company's material handling equipment, including jib cranes, gantry cranes, grabs, buckets and coil up-enders. Includes photo, dimensional diagrams and specification. H. L. Bushman Co., Inc.

108 Electric Hoist—Featured in Circular 166 are electric hoists for heavy duty lifting applications. Capacity and lifting speed data is furnished in tabulated form, along with other performance details. Chisholm-Moore Hoist Div., Columbus McKinnon Chain Corp.

109 Sling Chain Usage—"Vital Links to Safety" is a 12-pp pocket-size booklet on use, care, and inspection of sling chain. It crystallizes fundamental safety cautions to be followed for maximum chain safety. Five main sections cover chain safety terms, proper use of chains, safety cautions, inspection procedures and working load limits. The McKay Co.

110 Reusable Containers—Vulcanized fibre reusable shipping containers are described in this product bulletin. Illustrated with photos and line drawings, contains specifications and recommended container types for various classifications of equipment. National Vulcanized Fibre Co.

CONSTRUCTION

111 Partition Panels—An expanded metal partitioning designed to solve a variety of enclosure problems is described in this product bulletin. Construction and quick-erection details are illustrated and described and uses listed. The Globe Co.

112 Rolling Steel Doors—What is involved in specifying and installing industrial rolling steel doors? Can rolling steel doors be a factor in making production operations safer, more flexible? These and other questions are answered in 16-pp Bulletin G-59—a manual and guide including requirements for installation, specifications, drawings and dimensions. The R. C. Mahon Co.

113 Rugged Concrete Floors—How Masterplate concrete floors last six times longer than many concrete floors is explained in 24-pp Bulletin MP-4d. Discussed are major features sought in design of industrial floors subject to heavy use. Photos and diagrams illustrate explanations on method of installation and plants in which these floors are now in service. The Master Builders Co.

VALVES AND FITTINGS

114 Acid Resistant Valves—Eight-pp Technical Bulletin 8 describes an austenitic stainless steel for valving sulfuric acid and other corrosive liquids. Cross-sectional views show valve designs available and a graph illustrates strengths and temperatures of sulfuric acid handled. Alloy Steel Products Co., Inc.

115 Oil Valves, Fittings—Catalog B-159, 58 pp, details a broad line of valves and fittings for the petroleum industry. Includes bronze and aluminum valves and accessories—nozzles, fill caps, gate valves, cross and check valves, line strainers, others. Book is well indexed for easy reference, provides engineering data. Milwaukee Valve Co.

116 Surge Relief Valves—A surge Relief valve for protecting water lines against overpressure in the system is described in 8-pp Bulletin W-2-A. Gives complete engineering information, detailed drawings and suggested specifications. Golden Anderson Valve Specialty Co.

117 Servo Valves—Catalog 150 describes operating principles, design features and performance characteristics of company's line of pressure control servovalves. Features a schematic diagram, detailed cutaway photo, and performance curves, as well as glossary of servovalves terms. Moog Valve Co. Inc.

118 Forged Steel Unions—Eight-pp Bulletin U-2-58 provides detailed specification data on all types, sizes, of forged steel unions, materials and pressure ratings. Design and application advantages are discussed and illustrated. Forge and Fittings Div., H. K. Porter Co., Inc.

119 Pipe Fittings—Steel and brass fittings for flexible plastic pipe are listed in Sheet MF107. Gives sizes, weights, prices for adapters, couplings, ells, tees and clamps. Campbell Mfg. Co., Inc.

INSTRUMENTS, CONTROLS

120 Renting Instruments?—Eight-pp Bulletin GEA-6829 describes this company's nationwide instrument rental program. Covers scope of program and other factors involving more than 13,000 instruments offered for rent, including recording instruments, oscillographs, leak detectors, voltmeters. General Electric Co.

121 Recirculation Control—A pump recirculation control system to maintain safe, adequate pump flow at all times is described in Bulletin 560. Both pneumatic and electric for increasing pump flow by recirculation are shown. Bailey Meter Co.

ELECTRICAL

122 Master Unit Substations—Publication GEA-3800D, 58 pp, describes use of company's master unit substations in handling protective, transformation and switching problems in industrial and other power distribution systems. Subjects discussed include system reliability, substation flexibility, engineering, unified re-

BULLETINS

(Begins on page 21)

sponsibility, space requirements, appearance, installation, maintenance. Includes photos, drawings of networks. General Electric Co.

123 Distribution Equipment—Bulletin SB-555 contains 34 pp of detailed information on switchboards and secondary unit substations for a variety of distribution requirements. Illustrates and describes construction features and includes detailed application data, ratings, dimensional mounting data, schematic diagrams and dimensional drawings. Bulldog Electric Products Div., I-T-E Circuit Breaker Co.

124 Supervisory System—Bulletin GET-2925, 8 pp, covers application and operation of automatically programmed remote indication logging system designed to operate in conjunction with its space-code selector supervisory equipment. Includes information on coding; master and remote station components; adding to existing systems; physical arrangements, control power, operating voltages. General Electric Co.

125 Motor Control Center—Design and operation advantages of company's motor control center are detailed in this illustrated product bulletin. Photos of component features are included, as well as suggested specifications and other data. Electric Distribution Products, Inc.

126 Electromagnetic Devices—Sixteen-pp Bulletin GEA-6675 describes Seisyn and Synchro electromagnetic devices for accurate transmission of electrical angular data between two or more points. Discusses Selsyn and Synchro generators, motors, control transformers, differential generators, differential motors, tandem Selsyns, and system operation, and includes schematic and line drawings, dimensions. General Electric Co.

127 Switch Devices—Twenty-pp Catalog 67 describes lighted indicator and pushbutton switch devices designed for combined indication and control. Split pages allow quick selection and comparison of operator units, indicator units, and switch units. Dimensional drawings and photos are included, as well as detailed data. Micro Switch, Div. Minneapolis-Honeywell Regulator Co.

128 Pushbutton Stations—Corrosive resistant surface mounted pushbutton stations and pilot lights are described in this product bulletin. Applications and design and construction features are detailed, and ratings, dimensions and weights given. Allis-Chalmers Mfg. Co.

129 Button Cell Battery—This illustrated brochure highlights features, design potentials and specifications of a line of nickel cadmium, button cell batteries. Typical applications are illustrated and tables of specifications included. Alkaline Battery Div., Gulton Industries, Inc.

130 For Corrosive Spots—Sixteen-pp Bulletin 2699 on Condulets for corrosive locations, discusses corrosion-resistant properties of a variety of metals and finishes utilized. Charts show applications of each. Also provides formal listings of Plast-A-Coat Condulets for hazardous and non-hazardous spots. Crouse-Hinds Co.

131 Lighting Duct—Comprehensive information on company's flexible and versatile lighting duct designed to meet a variety of lighting needs is presented in 38-pp Bulletin ULD-660. Illustrates and describes various types of lighting duct, suspension equipment, auxiliary equipment, methods of suspension, installation and use of essential fittings. Includes section on lighting system planning, giving recommended levels of illumination. Bulldog Electric Products Div., I-T-E Circuit Breaker Co.

132 Readout Lamps—This booklet describes a line of electro-luminescent devices for display of letters and numerals in various types of dials and indicators in readout equipment. Applications and features are shown. Westinghouse Electric Corp.

133 Electrical Tubing—Resistance of an electrical metallic tubing to sulphuric acid, sodium hydroxide and salt spray is detailed and illustrated in Bulletin EMT-958. Tables listing sizes, diameters, weights, and specifications of tubing are included. Walker Brothers.

134 Expansion Fittings—Bulletin 12 describes weathertight conduit expansion fittings to relieve the strain of expansion and contraction in long runs of conduit. Illustrations are included to show engineering applications, assembly of units, installations. Spring City Electrical Mfg. Co.

PUMPS

135 Centrifugal Pumps—Single-stage centrifugal pumps featuring standardized construction, relatively few sizes, many interchangeable parts, are described in this 24-pp illustrated booklet. Provides selection charts, capacity data and dimensions for both close-coupled and base mounted models of the pumps. Taco Heaters, Inc.

136 Submersible Pump—Features and advantages of a submersible, portable electric pump are illustrated and described in this 6-pp bulletin. Applications are detailed and capacity curves and other engineering data given. Stenberg Mfg. Corp.

MECHANICAL POWER TRANSMISSION

138 Adjustable Speed Drive—Six-pp Bulletin 2750 describes features and applications of an adjustable speed drive which utilizes a stationary field construction to eliminate brushes, commutators and slip-rings. Dimensions, engineering data and a cutaway view are included. The Louis Allis Co.

139 Motor Gear-Reducer—Illustrated and described in 28-pp Bulletin 3100 are of all-steel, helical gear reducers with standard NEMA motors. Includes detailed information on unit size and construction, typical installations, data on accessories, suggestions for unusual or special applications, and specifications and dimensional data. The Falk Corp.

140 Helical Gear-Motors—Sixteen-pp Bulletin GEA-6704, illustrated in full color, presents construction features and applications of helical gear-motors and speed reducers. Cutaway drawings show maintenance features. General Electric Co.

141 Worm Gear Reducers—Folders 2724, 8 pp, introduces a worm gear speed reducer designed to operate in three positions, offers higher capacity, and is available from stock. Shows various mounting positions and gives selection procedures for proper applications. Tables cover service factors, load classes, input horsepower ratings, load ratings. Link-Belt Co.

Postage-free Reader Service Cards make it easy to order bulletins. Cards are provided on pages 235 and 236.

142 Bearing Units—Illustrated and described in 16-pp Bulletin BU-101-B are take-up units combining advantages of anti-friction bearings with unbreakable malleable housing, and rugged welded steel take-up frames with cadmium plated adjusting screws. Details of construction, dimensional tables and listing of stock sizes included. Browning Mfg. Co.

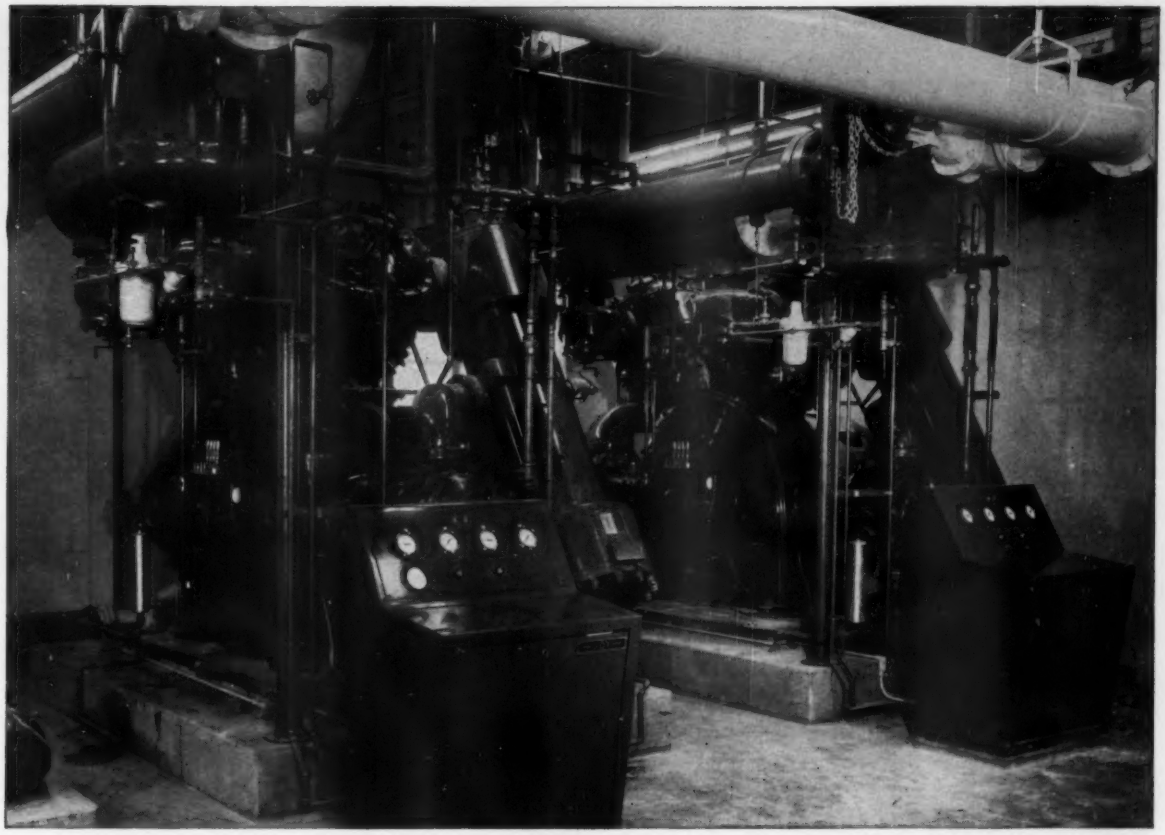
143 Stock Sprockets—Selection and ordering information on Grip-Master hub type and plate type sprockets, off the shelf and ready for use, is presented in 20-pp Catalog 100 B. Illustrated with photos and dimension drawings, catalog also gives data on flexible roller chain couplings, roller chains, plates. Acme Chain Corp.

144 Universal Joints—Catalog C4-10M contains 10 pp of detailed information on single and double universal joints. Includes assembly data, specifications, and conversion table. Curtis Universal Joint Co., Inc.

GASKETS, SEALS

145 Metal Gaskets—Design, construction and utility of company's spiral wound metal gaskets is detailed in 12-pp Bulletin AD-104. Details particular features of metal gaskets and lists various types available for special applications. Includes dimension tables and specifications. The Garlock Packing Co.

(More Bulletins on page 235)



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There are ten horsepower ratings of the WN-224, ranging from 350 to 1250 hp, 2400 to 7400 cfm. Get complete information on the WN-224, the smoothest running compressor in its field. Write for free bulletin 306-15.

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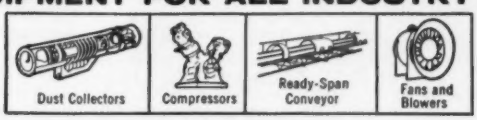
AIR MOVING EQUIPMENT FOR ALL INDUSTRY



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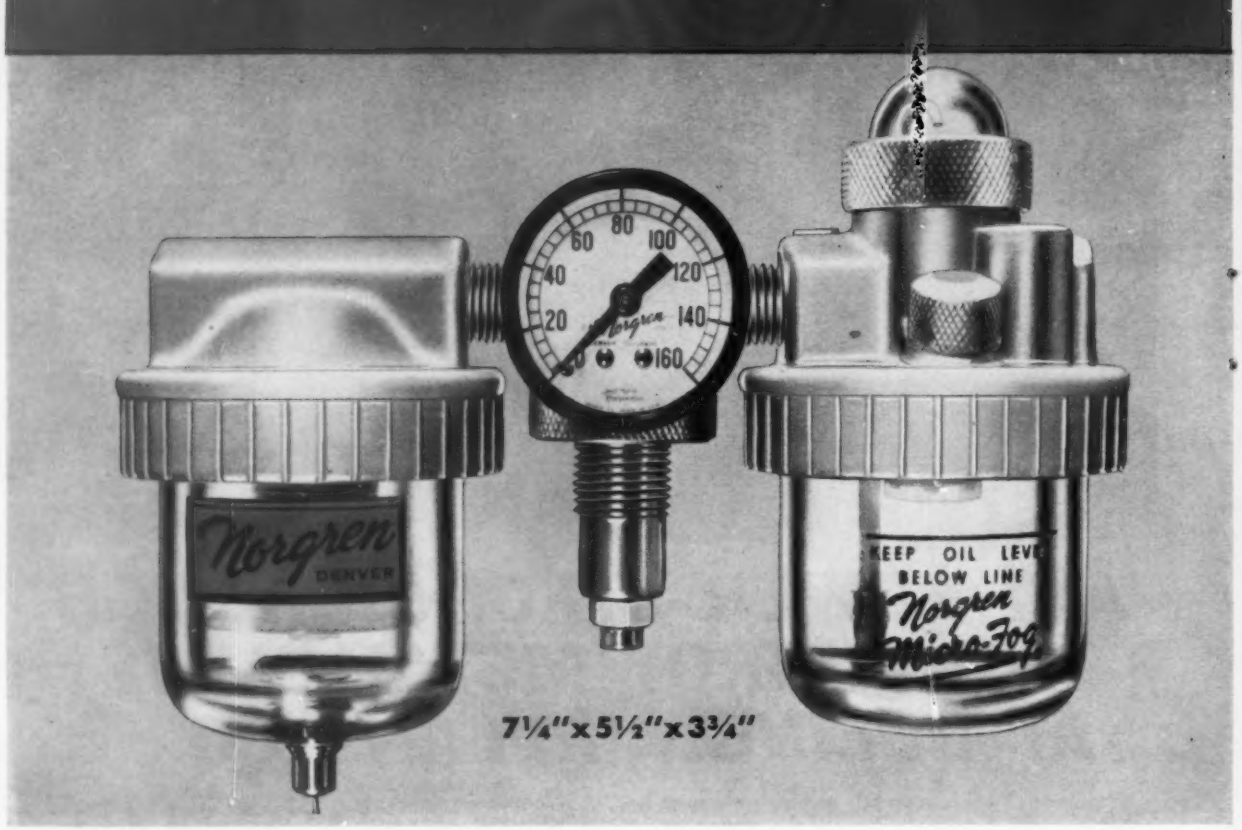

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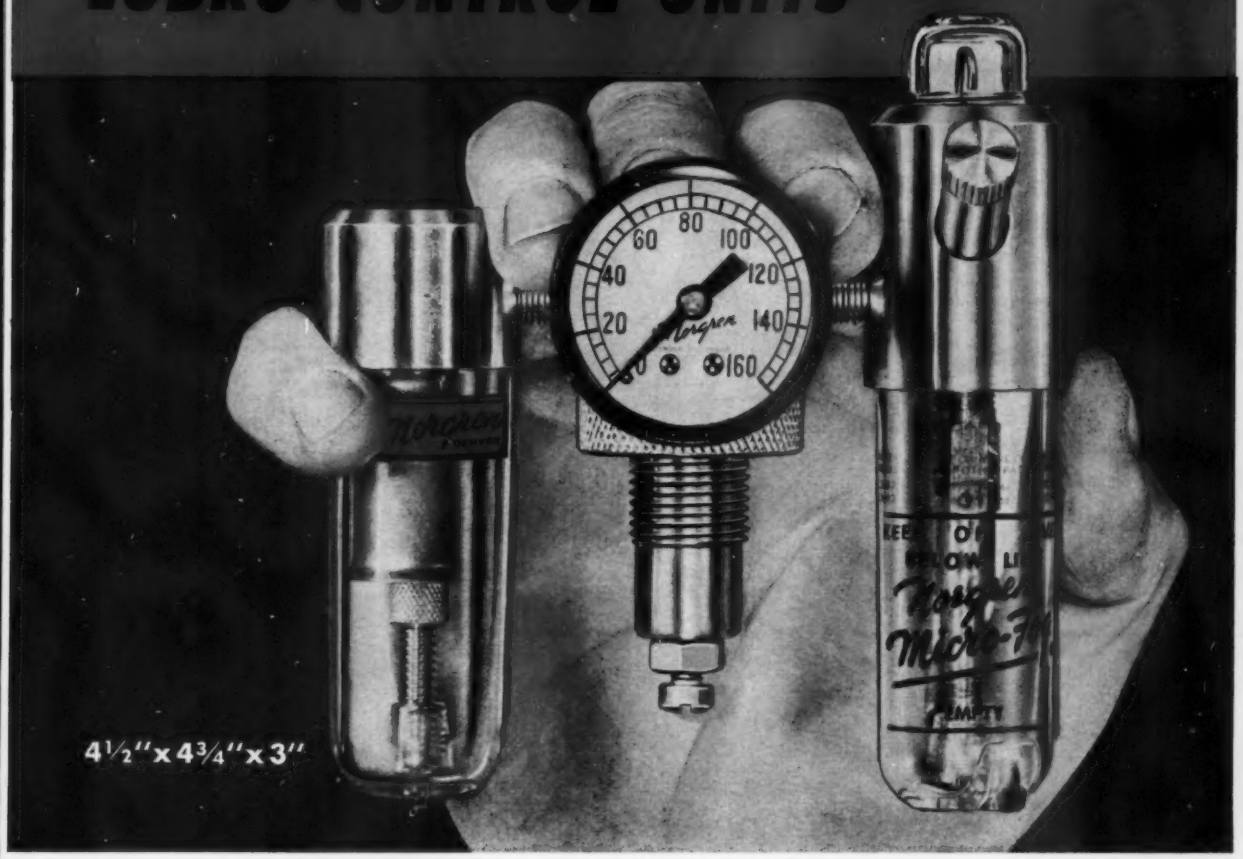
SO COMPACT...

LUBRO-CONTROL UNITS



Models Available for Air Flows from .05 to 20 cfm.

AIR LINE FILTERS

Two new air line filters provide efficient removal of liquids and solids from the air line, preventing damage to connected air equipment.

PRESSURE REGULATOR

A new small, compact pressure regulator is used for both series of Lubro-Control Units. It provides accurate, trouble-free regulation of the air pressure. Adjustable over a pressure range of 5 to 100 psi.

MICRO-FOG LUBRICATORS

New MICRO-FOG Lubricators provide efficient and adjustable lubrication for bearings, air tools, air cylinders and other air operated devices.

If it's Norgren...It's Dependable.

For complete information, call your nearby Norgren Representative listed in your telephone directory—or WRITE FOR BROCHURE NO. 915B.

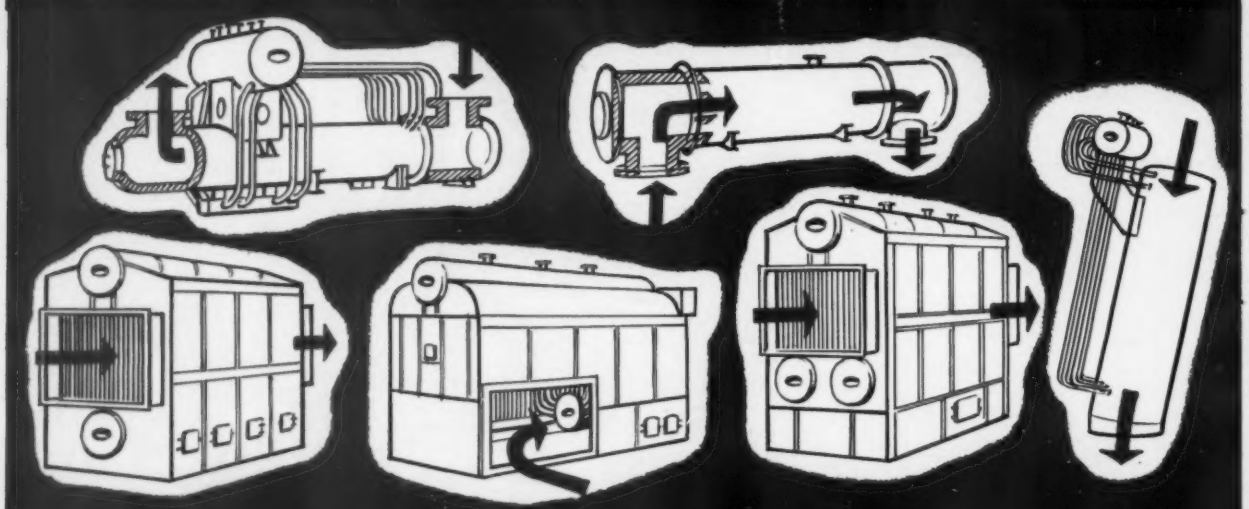
C. A. NORGREN CO.

3442 SOUTH ELATI STREET, ENGLEWOOD, COLORADO

For more facts circle 516 on Reply Card

Erie City HAS WHAT IT WASTE

~A COMPLETE LINE of FIRE and WATER TUBE BOILERS~



~USING THESE PROCESS GASES~

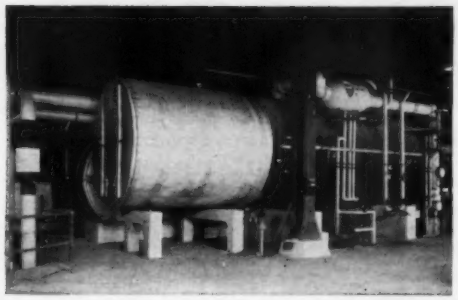
BLACK LIQUOR GAS • OPEN HEARTH GAS • INCINERATOR GAS
REFORMED GAS • ZINC ROASTER GAS
SODIUM SILICATE GAS • REVERBERATORY GAS • SO_2 GAS
NITRIC ACID GAS • GAS TURBINE EXHAUST

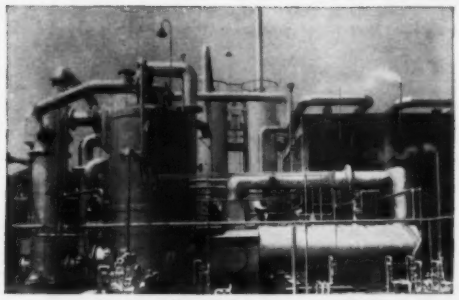
~AT THESE LEADING PROCESSING COMPANIES~

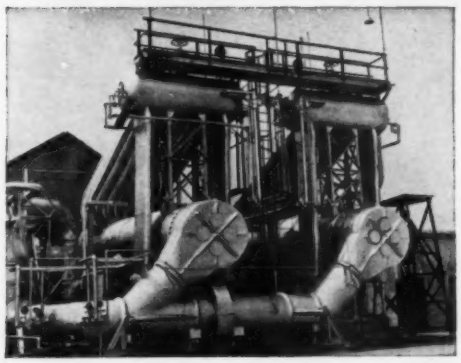
Adams Terminal Ammonia Co.
Advance Bag & Paper Co.
Allied Chemical & Dye Corp.
Allis Chalmers Mfg. Co.
American Cyanamid
American Oil Co.
American Rolling Mill
American Smelting & Refining Co.
Atmospheric Nitrogen Co.
Bethlehem Steel Corp.
Blaw Knox Corp.
Brea Chemicals, Inc.
Central Iron & Steel Co.
Chemical Construction Co.
City of Bridgeport, Conn.
Commercial Solvents Co.
Consolidated Chemical Co.
Continental Oil Co.
Diamond Alkali Co.
DuPont Co.
Eagle Pitcher Co.
Eastman Kodak Co.
General Chemical Co.
Gulf Oil Corp.
Jersey City Incinerator
Lion Oil Co.
Lowell Gas & Electric Co.
New York & Pennsylvania Co.
Olin Mathieson Chemical Corp.
Philadelphia Gas Co.
Reichold Chemicals
Shamrock Oil & Gas Co.
Sherritt Gordon Mines Ltd.
Southern Kraft Corp.
St. Helens Pulp & Paper Co.
Stauffer Chemical Co.
Texas Eastman Co.
Tidewater Associated Oil Co.
Union Bag & Paper Power Corp.
Union Oil Co.
West Virginia Pulp & Paper Co.

TAKES FOR EFFICIENT----

HEAT RECOVERY







Two factors combine to make Erie City Iron Works your reliable headquarters for specialized applications of waste heat recovery systems. - - - First, is our eagerness to cooperate with Process Engineers - - - whether the problem is routine or highly involved. As a result, we have gained valuable experience in waste heat recovery for modern processing that is unequaled in the steam generating field. - - - Second, Erie City Engineers have available a complete line of standardized fire- and water-tube boilers and the know-how to apply them to meet specified conditions. Erie City Waste Heat Recovery Systems are being used with all kinds of gases throughout the broad field of processing. We welcome the opportunity to work with your engineers on any waste heat recovery problem, or for that matter any steam generating problems.

Write for our comprehensive bulletin SB6093E.

You can depend on Erie City for sound engineering

ERIE CITY IRON WORKS • Erie, Pa.

•STEAM GENERATORS •SUPERHEATERS
•ECONOMIZERS •AIR PREHEATERS
•WASTE HEAT BOILERS •FIRE AND WATER TUBE PACKAGE BOILERS
OIL AND GAS BURNERS • STOKERS • PULVERIZERS

ERIE CITY Since 1840

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ROLLING STEEL DOORS

Manually, Mechanically, or Electrically Operated

MAHON CHAIN-GEAR OPERATOR

MAHON STANDARD POWER OPERATOR 920-P

The adaptability of Rolling Steel Doors to unusual openings is only one of their many outstanding advantages. In the 48'-5" x 15'-6" loading dock openings shown below, no other type of door could meet the requirements. The vertical roll-up action of Mahon Rolling Steel Doors requires no usable space either inside or outside the opening—no headroom restrictions. The all-metal construction gives you the permanence of Bonderite-protected galvanized steel . . . maintenance is minimal; and, in steel, you get maximum protection against intrusion and fire. No other type of door provides all of these important features which are so essential for functional efficiency in busy doorways today. When you are ready to buy a rolling steel door, check specifications carefully . . . you'll find, through comparison, that Mahon Rolling Steel Doors are built better to give you better service over a longer period of time. See Sweet's Files for complete information, including Specifications, or write for Mahon Catalogue G-59.

THE R. C. MAHON COMPANY • Detroit 34, Michigan

Sales-Engineering Offices in Detroit, New York and Chicago • Representatives in Principal Cities

Manufacturers of Rolling Steel Doors, Grilles, and Automatic Underwriters' Labeled Rolling Steel Fire Doors and Fire Shutters; Underwriters' Rated Metalclad Fire Walls, Insulated Metal Curtain Walls, Electrified M-Floors, Acoustical and Troffer Forms, Acoustical Metal Ceilings, Steel Roof Decks, and Long Span M-Decks.

The Mahon Power Operated Rolling Steel Doors shown here are installed in openings 48'-5" x 15'-6". The Roll-up Curtains are constructed from 6" Jumbo Slats of 16 Ga. Galvanized Steel which is Bonderized and Dip-Coated with Oven-Baked Enamel.

ROLLING STEEL DOORS, SHUTTERS AND GRILLES TO MEET EVERY REQUIREMENT

Above is a New, Enclosed Loading Dock at Mars, Inc., Chicago, Ill., Manufacturers of the famous Mars Candy Bars and numerous other confections. Four Mahon Power Operated Rolling Steel Doors, 48'-5" x 15'-6", are installed in the loading dock openings. Walter J. Olson & Co., General Contractors.

MAHON

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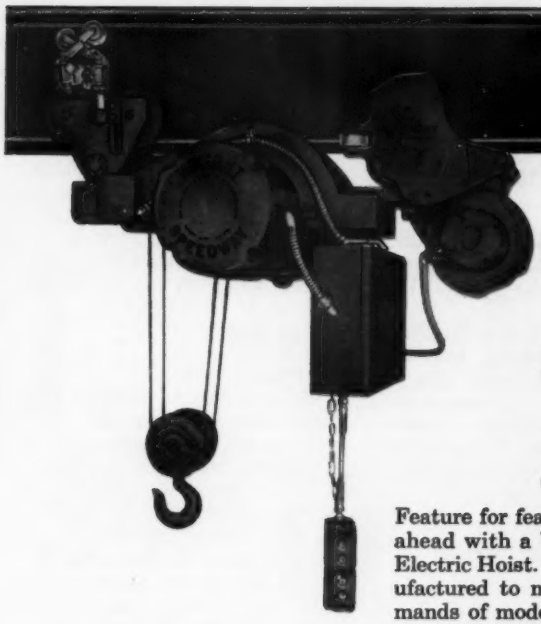
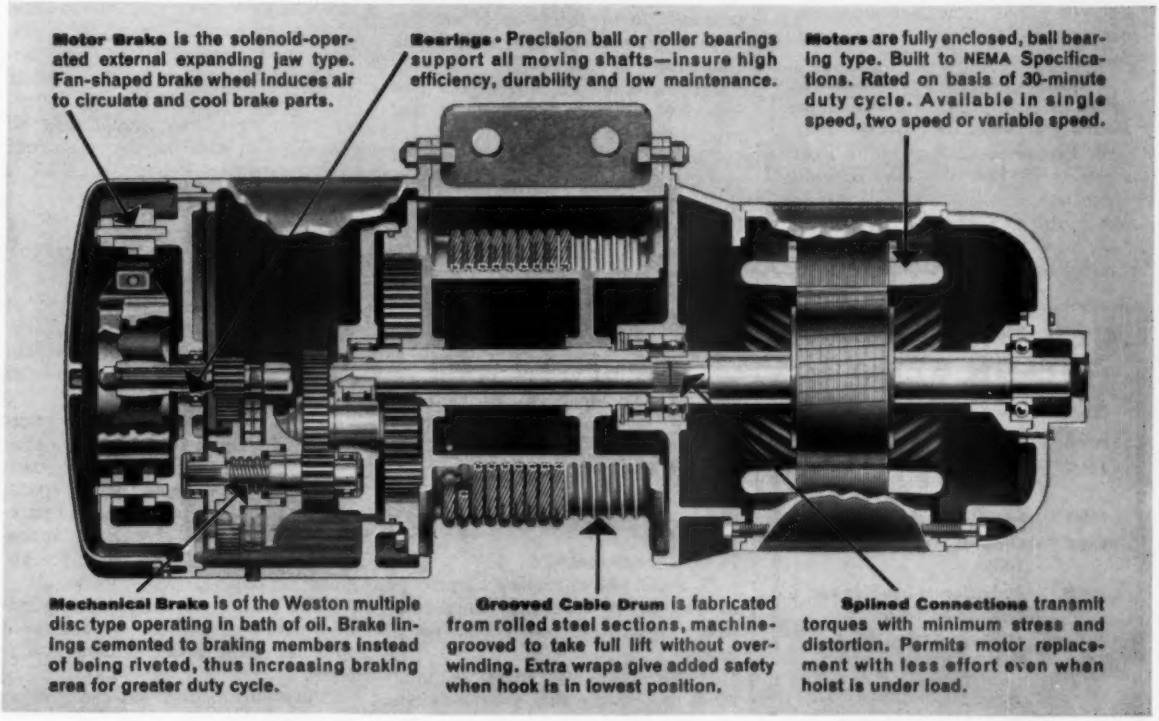


You Can't Buy a Low-Priced Hoist with the Outstanding Performance and Maintenance Features You Get as Standard Equipment from Wright

Feature for feature, you are years ahead with a WRIGHT *Speedway* Electric Hoist. Designed and manufactured to meet the varied demands of modern high speed production, *Speedway* Hoists give you the safety, adaptability, ruggedness and efficiency which you can't get in a low-priced hoist. Many of these performance and maintenance features are exclusive with WRIGHT. So if you are considering the purchase of an electric hoist, it will pay you to investigate the advantages of WRIGHT *Speedway* Hoists. For complete information, write our York, Pa., headquarters for **Catalog E-58.**


Motor Brake is the solenoid-operated external expanding jaw type. Fan-shaped brake wheel induces air to circulate and cool brake parts.
Bearings • Precision ball or roller bearings support all moving shafts—insure high efficiency, durability and low maintenance.
Motors are fully enclosed, ball bearing type. Built to NEMA Specifications. Rated on basis of 30-minute duty cycle. Available in single speed, two speed or variable speed.
Mechanical Brake is of the Weston multiple disc type operating in bath of oil. Brake linings cemented to braking members instead of being riveted, thus increasing braking area for greater duty cycle.
Grooved Cable Drum is fabricated from rolled steel sections, machine-grooved to take full lift without overwinding. Extra wraps give added safety when hook is in lowest position.
Splined Connections transmit torques with minimum stress and distortion. Permits motor replacement with less effort even when hoist is under load.

WRIGHT HOISTS

Wright Hoist Division · American Chain & Cable Company, Inc.

York, Pa., Atlanta, Chicago, Denver, Detroit, Houston, Los Angeles, New York, Philadelphia, Pittsburgh, San Francisco, Bridgeport, Conn.

ACCO

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FILLED TEFLON* BEARINGS

Chempro Filled-Teflon Bearings are tougher, harder, more wear-resistant and less subject to thermal expansion with the addition of specific filter compounds to virgin Teflon. Ideal for pumps, mixers, reactors and similar equipment where a chemically inert, non-corrosive, non-contaminating and non-adhering bearing material is a must.

Chemical & Power Products offers a complete Filled-Teflon Bearing service, including Chempro Finished Bearings either Pressed in Housings or without Housings, or Chempro Filled-Teflon Molded Tubes for machining bearings in your shop. Complete machining instructions furnished.

CHEMPRO FILLED TEFLON STYLES

FM-2	Glass-Filled Teflon
FM-3	Carbon-Filled Teflon
FM-4	Glass and Carbon-Filled Teflon
FM-5	Ceramic-Filled Teflon
FM-8	Graphite- and Zircon-Filled Teflon
FM-9	Molybdenum Disulfide and Glass-Filled Teflon
FM-10	Mica- and Glass-Filled Teflon

Write for Bulletin CP-558.

*duPont trademark

CHEMICAL & POWER PRODUCTS, Inc.

7 Broadway, New York 4, N. Y.

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BACKTALK AND FORETHOUGHTS

Edited by Marjorie E. Weissman

Clean-Up Time for Exchanger Tubes

PLANT ENGINEERING:

"Several months ago, we noticed an article in your magazine concerning 'Ultrasonic Cleaning for Heat Exchanger Tubes.'

"We also are interested in the ultrasonic principle of cleaning heat exchanger bundles and would like to obtain the names and addresses of the manufacturers of ultrasonic cleaners which you supplied to F. D. Davis, Superintendent, The Texas Co., Lockport, Ill." *C. W. Cooper, The Pure Oil Co., Nederland, Tex.*

► Done. Anybody else like the list? —*Editors.*

Court Decisions

PLANT ENGINEERING:

"Some time ago we read with interest an article in your section 'Court Decisions,' regarding a decision with reference to the carrying of an idea from one employer to another by an employee.

"We have looked through our past issues of PLANT ENGINEERING and cannot seem to find this article.

"We will appreciate it very much if you can send us a reprint of this particular article as well as the court in which this decision was made and the court brief number." *R. L. Rohrbaugh, Plant & Product Engineer, Hoyt Wire Cloth Co., Lancaster, Pa.*

► References to several cases such as our correspondent describes, have been forwarded to him. Further details are available from the compiler of this material, Albert Woodruff Gray, 112-20 Seventy Second Drive, Forest Hills, N. Y.—*Editors.*

Words We Like to Hear

PLANT ENGINEERING:

"I would like to request a free copy of section A, 'General Conditions' which appeared in one of your recent issues.

"Incidentally, you might be interested in knowing that your magazine is well received at this plant. I, personally, look forward to receiving it as I feel it is one of the most informative magazines offered to the plant man." *D. R. Dewart, Plant Engineer, The Celotex Corp., Lagro, Ind.*

► Copies of "General Conditions" will be sent to readers making the request on a company letterhead. Reprints of the five articles dealing with construction specifications are also available in booklet form for $2.00 each. A copy of "General Conditions" will be included with each reprint.—*Editors.*

Leaking Roof

PLANT ENGINEERING:

"We have several buildings of the quonset type, having a rounded top of corrugated sheet metal. We have been unable to completely waterproof these. Any heavy, blowing rain will leak through in numerous spots and it is extremely difficult to locate the exact spot where the leak occurs.

"I wonder if you or any of your readers have solved this type of waterproofing in a practical way? If so, I would be glad to hear from you." *Luther C. Ogburn, Plant Engineer, Well Surveys, Inc., Tulsa, Okla.*

►How about using a high-pressure compressed air caulking gun with a fairly heavy mastic that can force predetermined amounts of caulking underneath the overlap on the quonset roof? The problem of locating the exact point of a leak would thus be eliminated by caulking the entire roof covering overlap. Readers' suggestions welcome, too.—*Editors.*

Parking-Lot Questions Answered

PLANT ENGINEERING:

"In the February, 1959 issue of PLANT ENGINEERING there was an article in regard to parking lot layout changes at Philip Morris' Louisville plant.

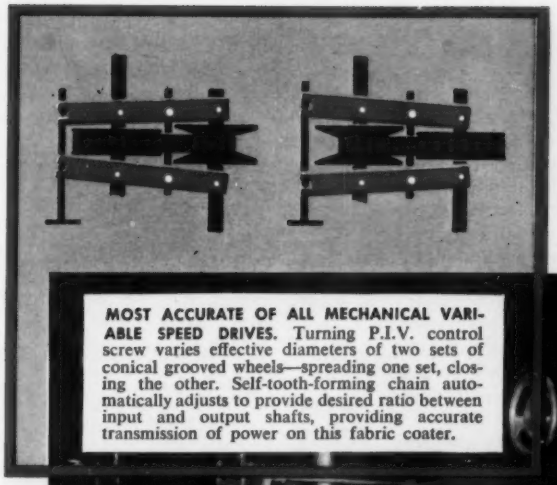
"Could you furnish us with information as to the size of the parking lot involved; width and length used in figuring out the new parking space; spacing between traffic lanes and parking spaces; width of parking spaces for square parking and width for angular parking?

"The reason we are requesting this information is because we are faced with the same problem here at our plant.

"Any information you can give us regarding this matter will be greatly appreciated." *Henri Masson, Maintenance Supervisor, Jacob Finkelstein & Sons Inc., Woonsocket, R. I.*

PLANT ENGINEERING:

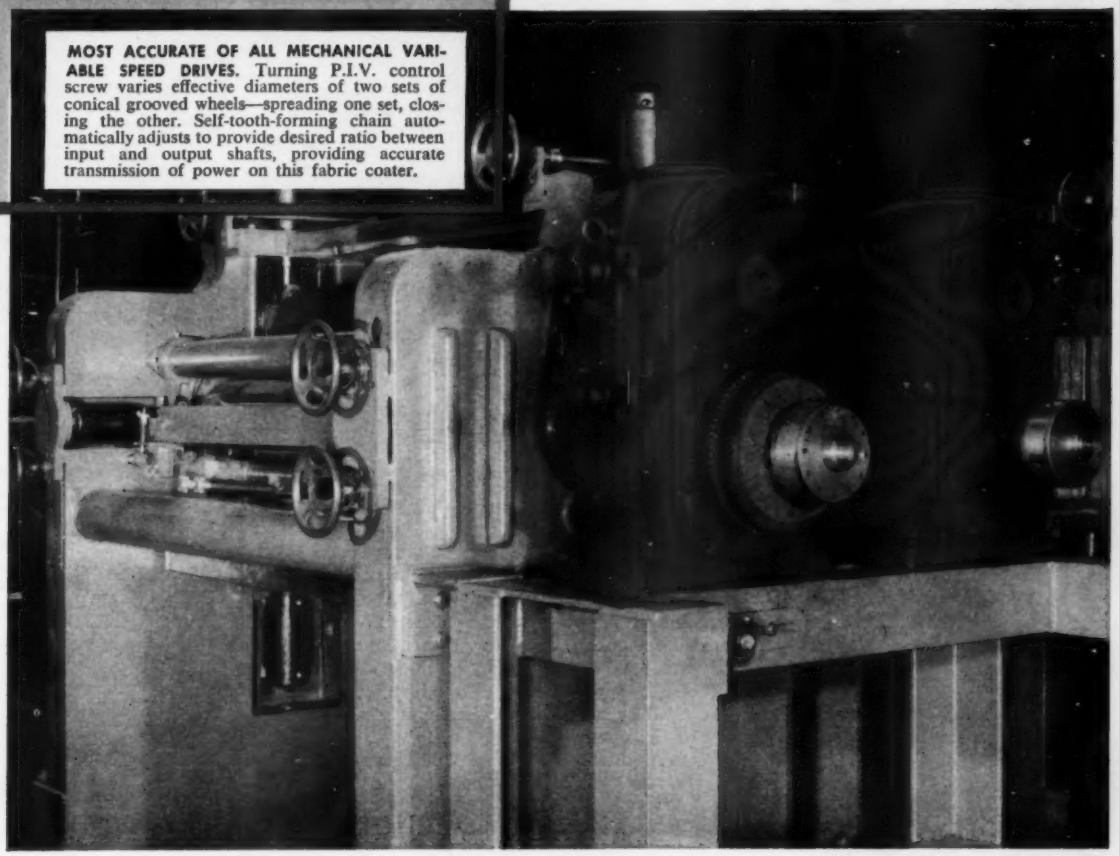
"After having read the article in the February issue of PLANT ENGINEERING, 'Parking Lot Layout



In principle . . .

in performance . . .

MOST ACCURATE OF ALL MECHANICAL VARIABLE SPEED DRIVES. Turning P.I.V. control screw varies effective diameters of two sets of conical grooved wheels—spreading one set, closing the other. Self-tooth-forming chain automatically adjusts to provide desired ratio between input and output shafts, providing accurate transmission of power on this fabric coater.



for positive, infinitely variable speed control

. . . there's nothing like P.I.V.

Here's a variable speed drive that is truly unique. Unlike conventional designs, Link-Belt P.I.V. with its all-metal chain drive is *not dependent on friction* for transmitting power.

P.I.V. permits fast, easy speed changing too. You can select any speed in its range—find it instantly, hold it indefinitely. No bother stopping the drive.

Because Link-Belt P.I.V. (Positive, Infinitely Variable) drives are fully enclosed, atmospheric conditions can't affect their efficiency. They're made in 8 sizes, 16 standard types. Ask your nearest Link-Belt office or authorized stock-carrying distributor for Book 2274.

LINK-BELT

P.I.V. VARIABLE SPEED DRIVES

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants and Sales Offices in All Principal Cities. Export Office, New York 7; Australia, Marrickville (Sydney); Brazil, Sao Paulo; Canada, Scarboro (Toronto 13); South Africa, Springs. Representatives Throughout the World. 14,042

For more facts circle 521 on Reply Card

PAGE

FENCE

Fence value depends on
—quality materials
—quality installation
You get both from PAGE

New Aluminized Fabric!
(other quality fabrics available:
galvanized steel,
aluminum,
stainless steel)

8 basic fence designs
6 gate styles

Expert installation
by specialists

Registered Certificate
of Quality furnished
to property owner

Good fences—since 1883

Write for helpful booklet

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National Headquarters • Monessen, Pa.

A product of Page Steel & Wire Division
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BACKTALK—FORETHOUGHTS

Changed—Result: More Cars, Same Space,' by B. H. Griesbach, of Philip Morris, Inc., I have been pondering one question.

"If the cars are located in the center of the lot, which are parked diagonally, were rotated 90 deg so that they were on a northwest-southeast line instead of a northeast-southwest line, would it make parking lot vacancy easier? This would not change the total number of cars but only their ease of exit, as they would be facing into the flow of traffic. This would mean that in the mornings when the cars arrived over a wider interval of time, they would have driven to the location and backed into place.

"It seems to me that even though there might be only a few minutes additional time involved, this might lessen evening traffic jams considerably. I should appreciate Mr. Griesbach's views on this." *Frederick Wm. Himmelein, Jr., Engineering Dept., Millprint, Inc., Downington, Pa.*

▶ Mr. Griesbach's replies to these letters follow:

"Each parking problem has a number of solutions based on the available information and we would certainly be happy to assist Mr. Masson in the way of suggestions if he would furnish us with a layout of the proposed area along with the number of cars to be parked and whether it is a two or three shift operation.

"To answer Mr. Himmelein's question, our employees come to work in the morning in a big rush, trying to meet the deadline of 7:00 a.m. Getting into the lot and parked quickly was a major consideration.

"On leaving the plant in the evening, they are on their own time and, true, they are always in a hurry, but we felt that inasmuch as they were going home, a little inconvenience at that time would be outweighed by the convenience of the morning arrangements.

In the evening, employees have learned, a few seconds hesitation on their part permits the cars ahead of them to move out with the minimum amount of delay and keeps the traffic flowing freely."

Dry Film Gage

PLANT ENGINEERING:

"Could you tell us where we may obtain the dry film gage mentioned in the article 'Preplan Your Painting Program' which appeared in your November, 1958 issue? We would also like a set of tear sheets of the article." *Kent I. Newman, Superintendent, Mechanical Maintenance, Anaconda Aluminum Co., Columbia Falls, Mont.*

▶ The gage, which goes under the name of "Elcometer" is available from the Gardner Laboratory, Inc., Bethesda 14, Md.—*Editors.*

Washing Tank for Lighting Fixtures

PLANT ENGINEERING:

"Would you tell us where we can purchase the portable wash tank shown on page 107 of the February issue of PLANT ENGINEERING?" *Walter Hawkins, Dept. of Public Works, New York, N. Y.*

▶ The tank mentioned in our article, "Clean Lighting Pays Off Fast," is used for washing lighting fixture reflectors and louvers. It is available from the C. & S. Lighting Maintenance Co., 11015 Briggs Rd., Cleveland 11, Ohio.—*Editors.*

Stocking Up

PLANT ENGINEERING:

"It would be greatly appreciated if you would kindly forward to us the information we have listed below, as appearing in the October, 1958 edition of PLANT ENGINEERING:

Annual indexes to PLANT ENGINEERING for the years 1955, 1956 and 1957.

"Construction Briefs in the form of four booklets, for which we enclose remittance.

"Sixteen-page copy of section A, 'General Conditions' and reproductions of bulletins.

"A reprint of the article 'Plant Engineering Follow-Through—How to Minimize Delays in Plant Projects' by F. John Eggert, Mechanical Engineer, Hamburg, N. Y.

"A reprint of the article 'Determining Equipment Replacement Needs' by R. A. Butler, Struthers Wells Corp.

"Thank you for your courteous service to us in the past." *K. Pattison, Electrical Maintenance Engineer, Canadian British Aluminium Co., Ltd., Baie Comeau, Que., Canada.*

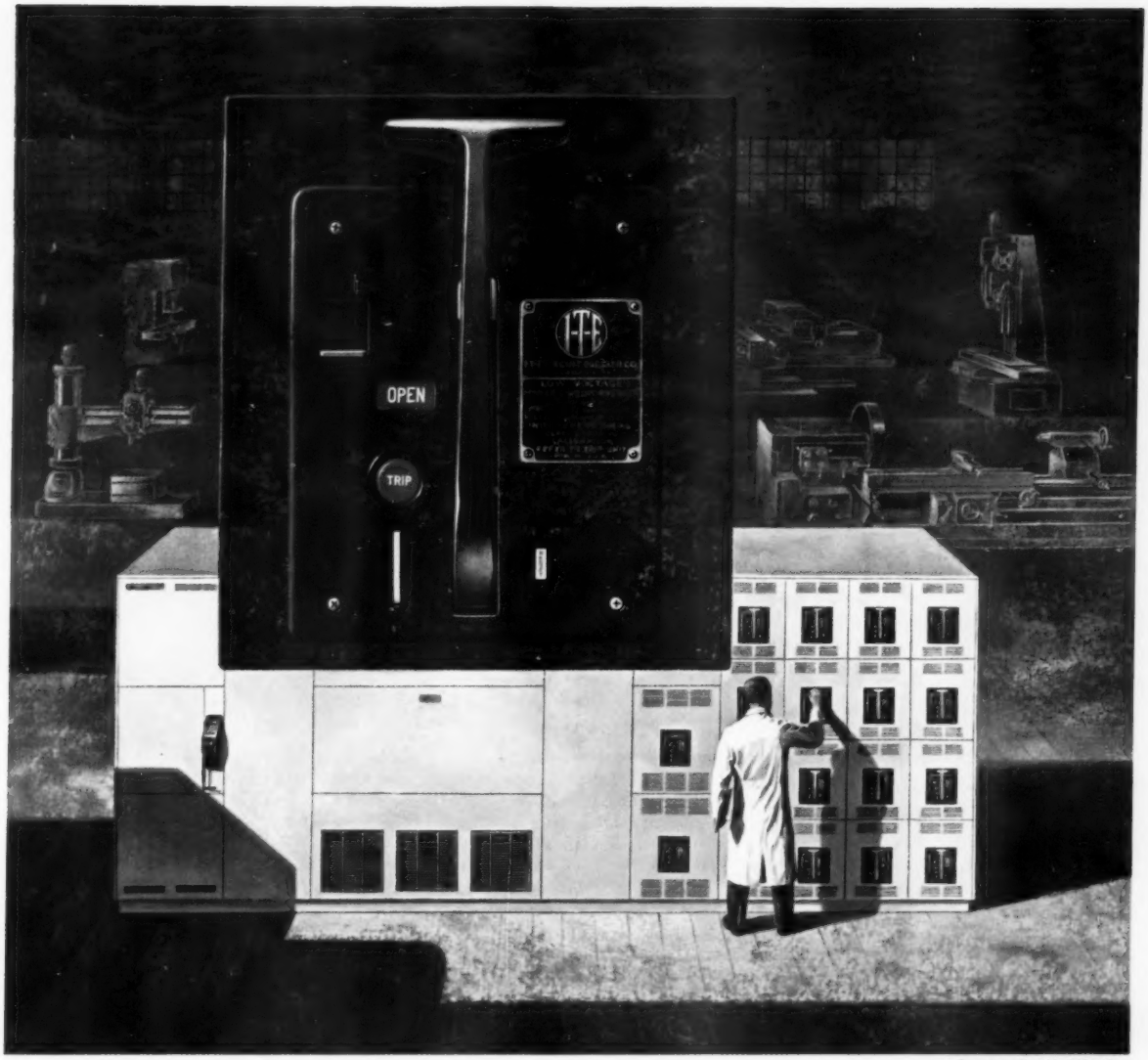
PLANT ENGINEERING:

"I would very much appreciate receiving two sets of tear sheets on Designing in Reinforced Concrete by B. A. Wasil.

"The Construction Briefs are very helpful and informative." *W. W. Wallace, Construction Engineer, Universal-Rundle Corp., Mahoningtown, Pa.*

▶Copies of all the above articles have been sent to these correspondents.—*Editors.*

For more facts circle 523 on Reply Card ⟶



Painting by Ned Seidler

FACT

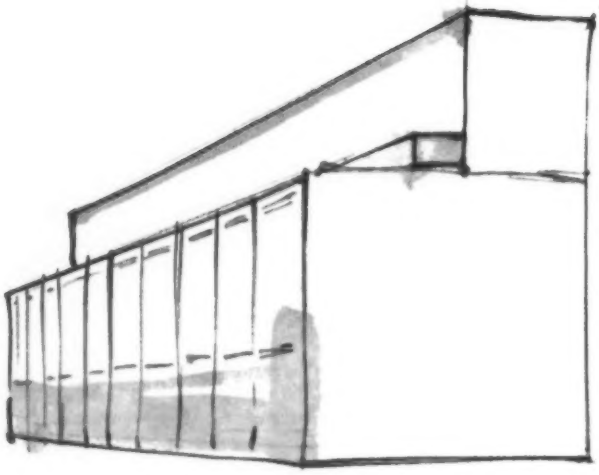
A dollar allocated for electrical equipment is worth more . . . when it is used to buy I-T-E equipment. Because I-T-E's policy is to build its equipment better, and yet charge no more.

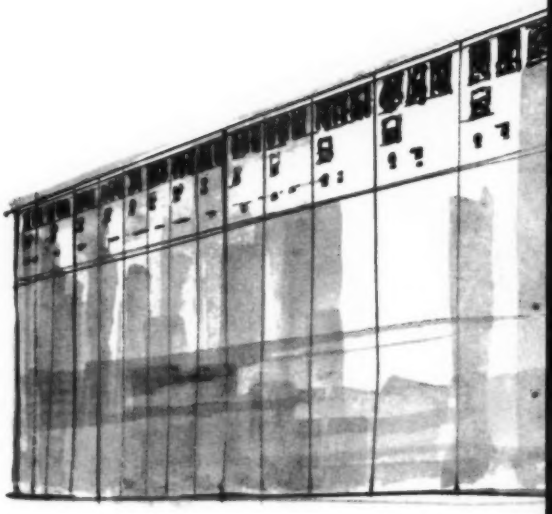
Take a typical secondary unit substation, for example. It features the new K-LINE circuit breakers . . . today's most advanced line. They stack four high in ratings up to 600 amp . . . save roughly ⅓ the space and half the weight formerly required. Circuit breaker pulldown handle with stored energy mechanism gives quick-make closure that means greater operator safety and longer contact life. The breaker can be drawn out to disconnect position without opening the door. And if the load increases later, expanded range trip devices adjust quickly and without added expense.

These features add up to real dollars and cents savings over the life of the equipment. Yet they cost nothing extra. In addition, I-T-E substations are engineered and manufactured in a single I-T-E plant for extra installation ease and better performance.

There are other I-T-E facts too. Turn page.

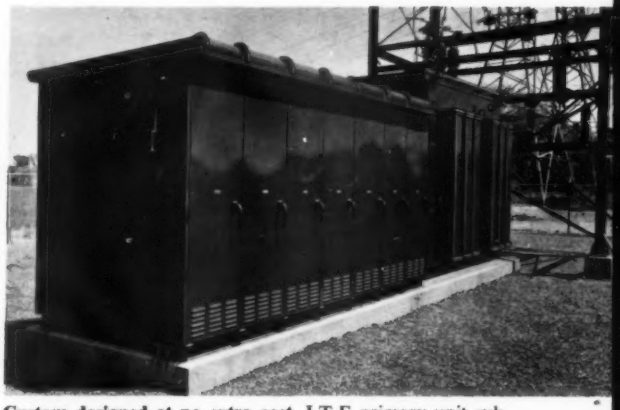
I-T-E CIRCUIT BREAKER COMPANY



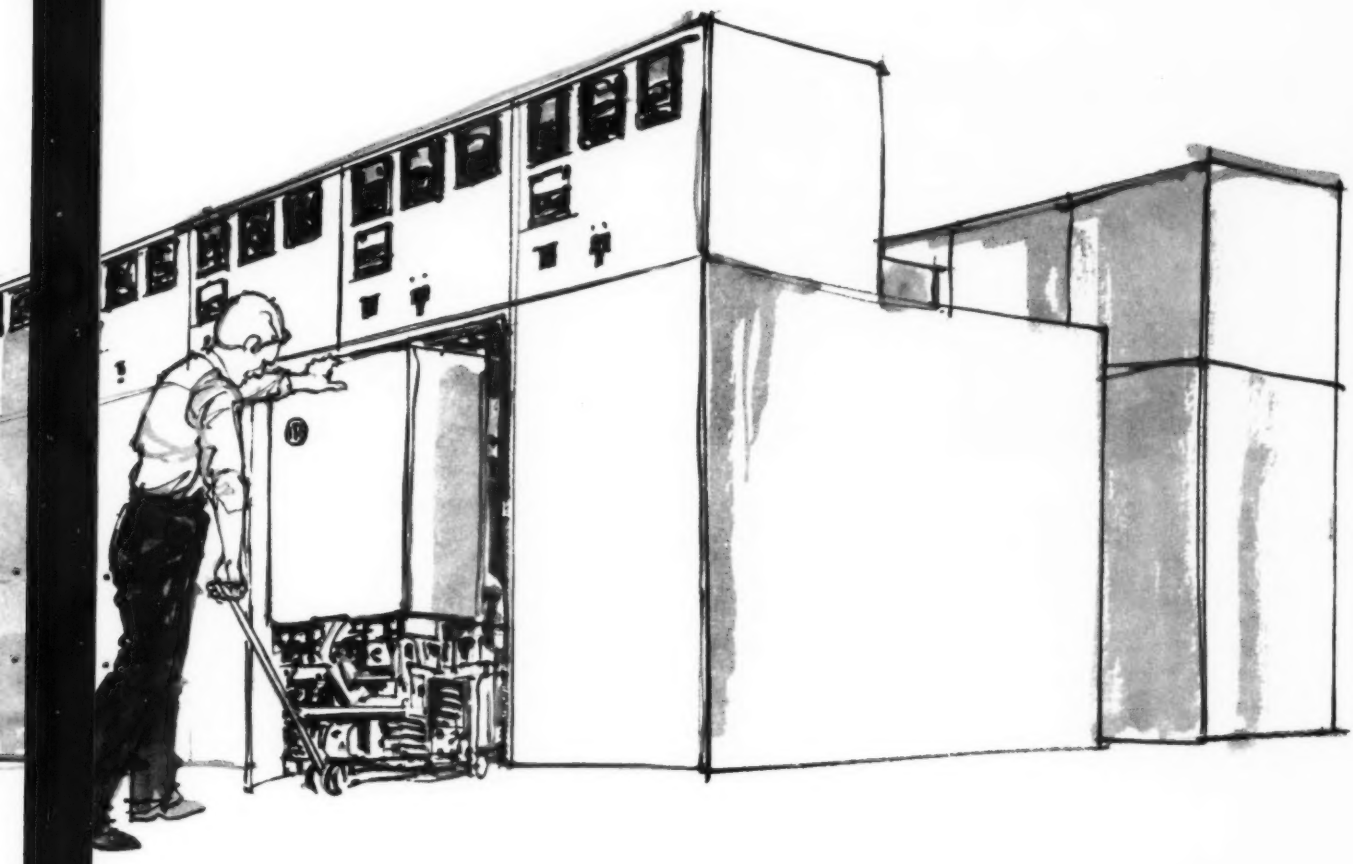


WHERE ELECTRICITY GOES I-T-E GOES

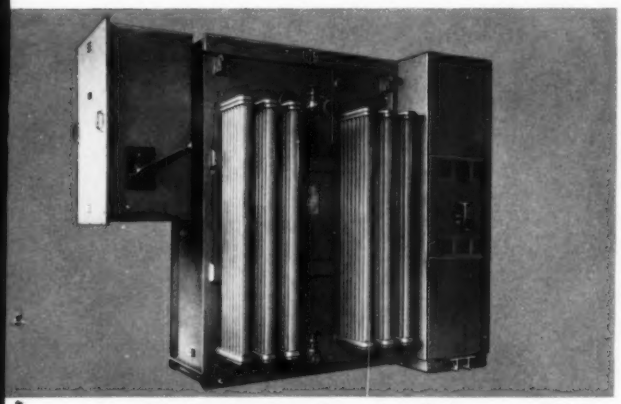
Are you fully acquainted with the broad I-T-E line . . . and the many ways it can help your dollars buy more?



Custom designed at no extra cost. I-T-E primary unit substations are designed and built to meet the specified power, space and future expansion requirements of the particular installation for which they're ordered. In addition to standard outdoor metal-clad construction, weatherproof walk-in switchgear is also available. Transformer and switchgear sections are constructed in the same plant to assure smooth coordination of components, easier assembly, pretested performance, and on-time delivery.

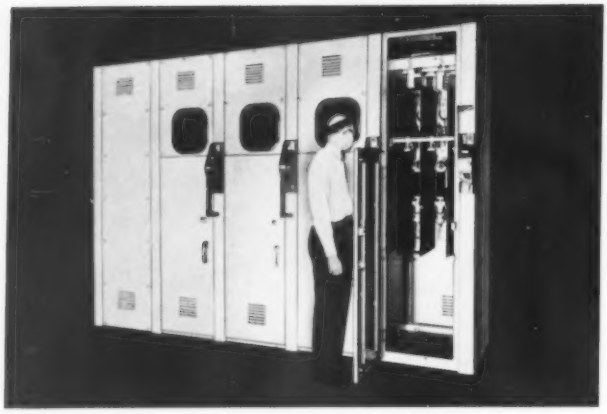


Protection for primary power. I-T-E metal-clad switchgear has many extra advantages not available elsewhere. Take a good close look. You'll find extra sturdiness that means extra serviceability. And extra craftsmanship that gives the owner a feeling of pride. For easy inspection, even the rear doors are hinged, and components are completely accessible. All essential circuit breaker components are mounted on the breaker for easier access. Uniform flux density magnetic arc field means superior protection . . . especially against high current faults. For extra safety, breakers stop automatically in test position when they're rolled into the compartments. They can't be moved into or out of connected position unless they're open.

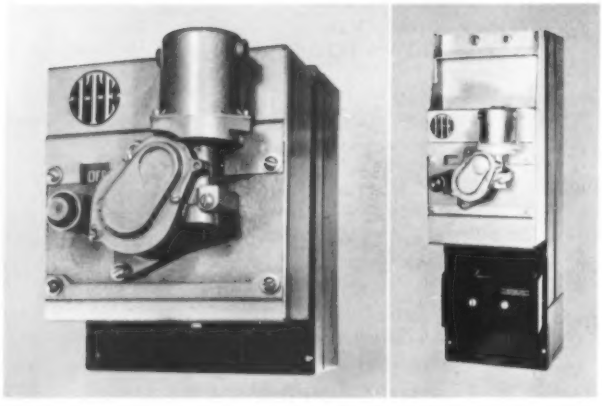


Self-contained substation. Saves installation cost. I-T-E TRANFO-UNIT combines primary disconnect, transformer and secondary circuit breakers all in one package. Nothing else to buy. Simplifies ordering. Delivered complete. Installation time and cost reduced to an absolute minimum. No complicated assembly of separate parts. Gives neat appearance. Completely safe. No live components open to contact by personnel. Needs no fence. Use for incoming power up to 3000 kva. Or spot near load areas in large plants.

600 volt value package. New URELITE® individually enclosed I-T-E K-LINE circuit breaker is ideal for single circuit protection and control, such as large motors and other heavy loads or for service entrance on many commercial-type buildings. Main disconnect contacts are visible through a side window for extra safety. Features quick-make closure, closed door disconnect, and expanded range trip device. Available in capacities from 15 to 1600 amp continuous, up to 75,000 amp interrupting.



Economical primary switching. I-T-E power switching centers save cost and time. Give dependable fused protection at low initial investment. Building block design speeds delivery. Preassembled units easy to install. Performance-proved I-T-E switches close safely into fault. Available for remote or automatic control. Up to 14.4 kv and 1200 amp.



Molded case economy . . . remote control luxury. Now I-T-E CORDON® circuit breakers are available with new TELEMAND* motor-operators for remote opening, closing or resetting. Gives pushbutton control from a distance. Permits automatic operation. CORDON circuit breakers provide up to 100,000 amp interrupting capacity in roughly half the switchboard space required by alternative devices. They cost approximately ⅓ less. TELEMAND is available for the complete range of molded case circuit breakers from 70 to 800 amp.

**Telemand is an I-T-E trademark*

I-T-E Circuit Breaker Company C-63A

1900 Hamilton St., Philadelphia 30, Pa.

- ☐ Secondary unit substations
- ☐ Metal-clad switchgear (4.16 and 13.8 kv)
- ☐ Primary unit substations
- ☐ URELITE circuit breakers
- ☐ Molded case circuit breakers
- ☐ Metal-enclosed bus
- ☐ Outdoor air switches
- ☐ TRANFO-UNITS
- ☐ Power switching centers
- ☐ TELEMAND (motor-operated molded circuit breakers)
- ☐ K-LINE LV switchgear (600 volt)
- ☐ Reclosers
- ☐ Distribution cutouts
- ☐ Other.....

Name.....Title.....

Company.....

Street.....

City.....Zone.....State.....

SEND COUPON

Get complete, up-to-date information on I-T-E equipment.

I-T-E CIRCUIT BREAKER COMPANY

You get these benefits when you install YARWAY GUN-PAKT EXPANSION JOINTS

Why do industrial plants, institutions, universities and central heating plants SPECIFY and INSTALL Yarway Gun-Pakt Expansion Joints?

Because with Yarway you get:

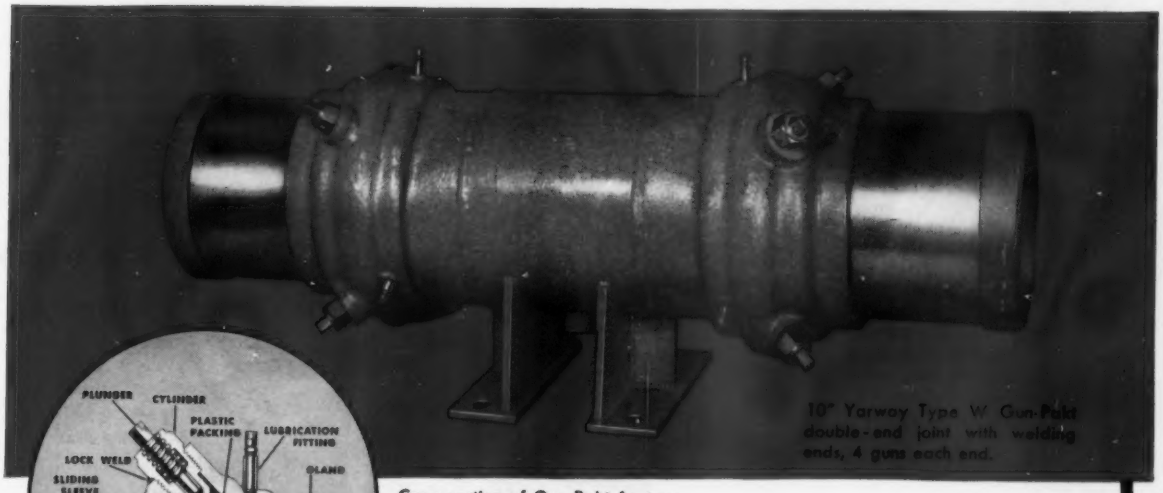
- **CONTINUOUS SERVICE**
  Costly shutdowns are eliminated. Packing is seldom necessary but may be added *under full line pressure*. No vents are necessary. Never needs repacking.
- **RUGGED DEPENDABILITY ALL STEEL CONSTRUCTION**
  Durable chromium plated seamless steel sleeves. No chance *of metal fatigue*. Wrought steel bases provide rugged, positive anchorage.
- **INTERNAL AND EXTERNAL GUIDES**
  Positive alignment of sleeve in stuffing box *—where it counts!*
- **LIGHT WEIGHT, STREAMLINED DESIGN**
  Requires less space to install—less space to maintain—smaller manholes.

Many Gun-Pakt joints have been *in service over 25 years with only nominal maintenance*—no major repairs or periodic overhauls. Maintenance costs are negligible—records show average to be one manhour and 65 cents worth of packing per joint per year. AND—NEVER A SHUTDOWN FOR REPACKING!

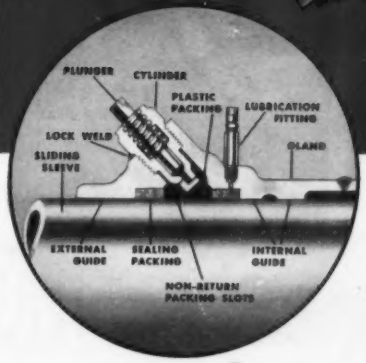
YARWAY field engineers are qualified to advise on installation and service—at no cost to you. Investigate today. Write for Bulletin EJ 1917 ('59).

FOR YOUR NEXT PIPELINE JOB—BE SAFE—BE SURE! SPECIFY YARWAY GUN-PAKT.

YARNALL-WARING COMPANY
145 Mermaid Avenue, Philadelphia 18, Pa.
BRANCH OFFICES IN PRINCIPAL CITIES



10" Yarway Type W Gun-Pakt double-end joint with welding ends, 4 guns each end.



Cross-section of Gun-Pakt feature. To add packing, just insert a plug and turn the plunger. Note non-return packing slots.

YARWAY GUN-PAKT

For more facts circle 524 on Reply Card

J-M Marinite...

Here's how

Now construct your own ovens *in your shop* with efficient, easy-to-work Johns-Manville Marinite.

fast, new way to oven economy

. . . easy to fabricate . . . easy to maintain . . . builds and insulates in one operation

If downtime and costs are delaying needed oven changeovers—or installation of new ovens—in your plant, here's big news: Johns-Manville Marinite, made of asbestos and diatomaceous silica, can show you the way to build your own high-efficiency oven *in your own shop* at low cost.

Get these important savings

When you build your oven with Marinite, you eliminate the need for linings and outer facings, because Marinite is *both* an efficient insulation *and* a structural board. Your shop can prefabricate oven panels from large 4′ x 10′ sheets with standard saws and drills—assemble them quickly with a minimum of structural support.

Cut maintenance to the minimum

Marinite ovens last indefinitely with little or no maintenance. Made of asbestos fiber, diatomaceous silica and an inorganic binder, Marinite never rusts, rots or corrodes . . . is completely unaffected by moisture condensation during cyclic shutdowns. A rigid, homogeneous material, Marinite eliminates "hot spots" caused by soft insulations that settle and sag in service.

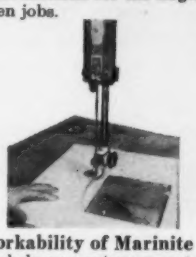
Change over with Marinite now for new oven efficiency

Don't put off your oven changeover another day. With Marinite's low conductivity, you can add new efficiency to your oven at unmatched low cost. And you'll find Marinite cuts heat loss so effectively that areas directly adjacent to ovens become usable, comfortable work areas.

Marinite now carries Underwriters' label

Marinite-23, 36, and 65 now carry Underwriters' Laboratories label for: *zero* flame spread; *negligible* fuel contributed; *zero* smoke developed (based on 100 for untreated red oak). For information write Johns-Manville, Box 14, New York 16, N. Y. In Canada, Port Credit, Ontario.

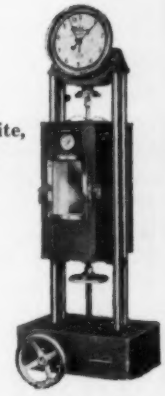
Large Rigid Sheets, up to 4′ x 10′ make Marinite the ideal material for the largest oven jobs.



Workability of Marinite can help you cut oven costs downtime by fabricating and assembling your own ovens.

W. C. Dillon & Co. uses Marinite for easy assembly and close temperature control

W. C. Dillon & Co., Inc., Van Nuys, California, makers of scientific instruments and temperature control cabinets for materials testing, uses Marinite to maintain precise temperature *and* to present a clean, trim appearance. "We would certainly recommend Marinite to any concern interested in *cutting costs and in producing a fine piece of finished equipment,*" says Robert E. Dillon, V. P.



Made of Marinite, Dillon cabinets maintain precise temperatures for materials testing.

JOHNS MANVILLE JM PRODUCTS

JOHNS-MANVILLE
Insulations
FOR LASTING THERMAL EFFICIENCY

For more facts circle 525 on Reply Card

PLANT ENGINEERS' DIGEST —so those who rush may read and know what's new

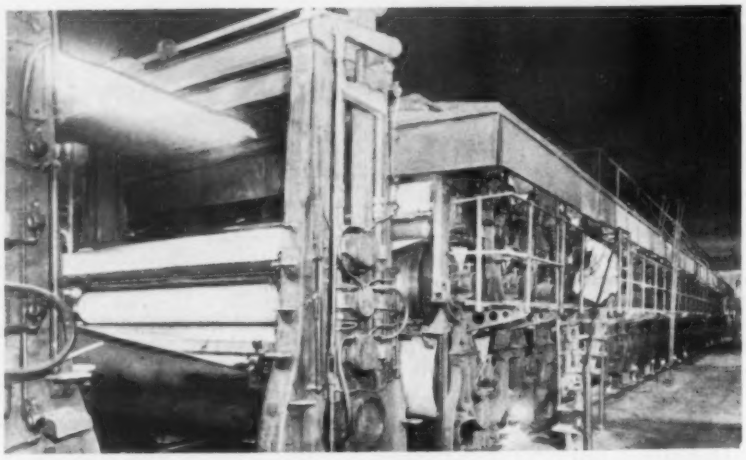
Edited by Marjorie E. Weissman

Steamline Maintenance on Paper Dryers Reduced by Boiler Feedwater Treatment

STEAMLINE maintenance has been reduced more than 60 per cent at Whippany Paper Board Co., by adding a filming amine to the boiler feedwater. This causes a thin protective film to form on the metal surfaces contacted by the condensate, thus controlling rust and corrosion.

Every eight hours a batch of the chemical is mixed, using condensate at temperatures between 130 F and 170 F. The batch is proportioned to use 1¼ parts of amine per million pounds of steam. When the chemical was first used, slightly higher proportions were used to clean out scale deposits.

Extraction steam, at about 45 psi, is used in more than 261 dryers on each of the plant's paper machines. Heat from this steam is transferred to the paper pulp passing through the dryers. Pipe corrosion and steam trap clogging had become a problem in these lines and 18 to 20 corroded pipe nipples had to be replaced every three weeks.

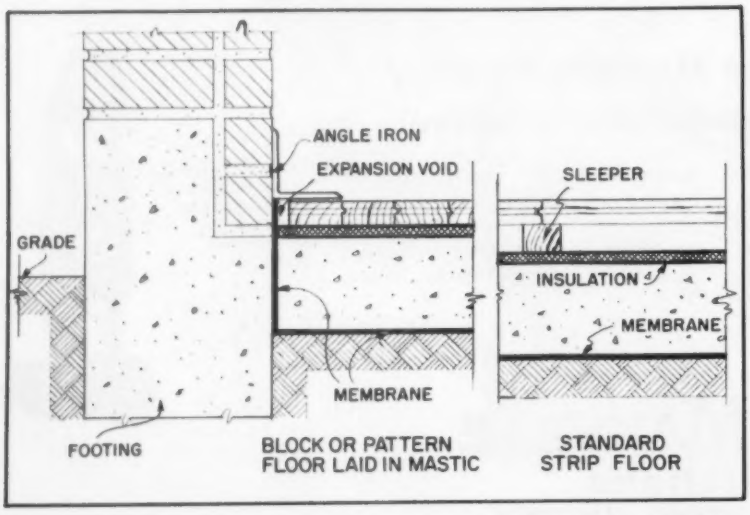


Steamlines were purged of corrosion deposits by amine in boiler feedwater.

Surface temperature of the dryers has increased about 20 F since old corrosion deposits were cleaned out. Heat transfer has improved, saving fuel. *From a release of Hagan Chemicals & Controls, Inc., Pittsburgh, Pa.*

Foundation for Hardwood Industrial Floors Built on Grade

HEAVY DUTY FLOORS of Northern hard maple can be specified advantageously in one-story industrial plants built on grade. One such structure, built in recent years, has several hundred thousand feet of 33/32-in. thickness maple flooring laid throughout. The building, a textile mill, is about 1200 ft long and 350 ft wide.



Diagrams show placement of membrane and underfloor insulation for floor.

A recently-developed procedure in waterproofing comprises the installation of a water- and vapor-proof membrane directly over virgin, hard-tamped grade or fill material. This insures isolation from moisture and vapor originating in the soil. The membrane should possess a vapor permeance of 0.010 perm or less and be highly resistant to chemical fungus or insect conditions in the soil.

Another method consists of laying a vapor barrier or damp-proofing membrane, having a permeance value of 0.5 perm or less, directly over washed gravel fill. After the fill is topped with concrete, asphalt-saturated felt damp-proofing is provided over the concrete slab, butting all edges. When the exterior grade is above the level of the finish floor line, two or three layers of membrane should be provided and continued up inside the walls to 6 in. above the floor slab.

(Continued on page 42)

Up to 163 Degree Spread — Up to 236,000 Candlepower: Now in

New CROUSE-HINDS Mercury Floodlights

Plus 6 Outstanding Advantages Never Before Offered in Mercury Floodlights of this Wattage

New—700 to 1,000 watt mercury floodlights with the widest beam-spread on the market . . . up to 163°. Or the brightest . . . 236,000 candlepower concentrated in a 75° solid angle! Complete with ballasted assemblies that will start lamps at —30° F. offering a further choice of three different reflectors and four different lenses (including a spun-sealed plate glass lens) to adjust the beam-spreads and candlepowers to your particular needs. All using either clear lamps for brightness, or phosphor-coated lamps for color enhancement. And all offering rear-door relamping and positive locking in open position.

Mercury Floodlighting Is Here to Stay

No other floodlight lamp approaches mercury for long burning hours . . . for economy of cost and labor in relamping. And no other mercury floodlight approaches these new MVF's for convenience of relamping, aiming, utilization factor and maintenance of output over a long period of burning. Other lights in the Crouse-Hinds range of floodlights from 250 to 700 watts provide varying beam spreads, intensities and efficiencies.

* For assistance in computing the exact fixtures, wattages and footcandles for your needs, consult your Crouse-Hinds distributor or the Illumination Department at the Factory.

CROUSE HINDS

MAIN OFFICE AND FACTORY: SYRACUSE, NEW YORK
Crouse-Hinds Company of Canada, Ltd., Toronto, Ont.
Crouse-Hinds Instrument Company, Inc., Silver Spring, Maryland

• CONDULET® ELECTRICAL EQUIPMENT (Explosion-Proof and Conventional) • FLOODLIGHTING
• TRAFFIC CONTROL SYSTEMS • AIRPORT LIGHTING and WEATHER MEASURING EQUIPMENT •

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For more facts circle 526 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 40)

With these methods, both of which are suitable foundations for hard maple flooring, laying of building paper of any type between the subfloor and finish floor can be eliminated. *From a release of Maple Flooring Manufacturers' Association, Chicago, Ill.*

Distortion-Free Glass

DISTORTION-FREE glass is being produced by the British firm of Pilkington Brothers, Ltd. by a process which gives the product the best properties of plate glass and fire-finished sheet glass. No grinding and polishing is required.

A continuous ribbon of glass passes from the furnace to float on the surface of molten metal held at a controlled temperature. The glass has a lustrous finish on both sides. Equipment for the new process is 646 ft long, compared with more than 1000 ft for equipment used in other processes.

The technical advantages of the process are: It makes glass which is exceptionally parallel and free from distortion; the glass has fire-polished surfaces of better quality than that achieved by grinding and polishing; and the process is continuous up to the time the ribbon of glass emerges from the cooling oven. *From a release of British Information Services, New York, N.Y.*

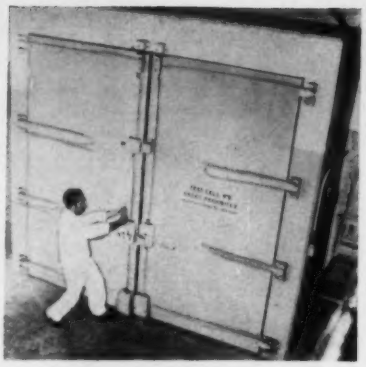
Doors in Tandem Reduce Noise

WEAKEST LINK in reducing the noise emitted from jet engine test cells are the doors for equipment and personnel. In building six new test cells, Orenda Engines Ltd., Malton, Ont., used sound reduction doors mounted in pairs to muffle the noise of turbo-jet engines under test.

Orenda's problem was aggravated because the test cells must handle any turbo-jet engine that may be designed during the next 10 to 15 years.

Two sets of sound reducing "doors-in-tandem" were installed in each of the new cells. The deafening roar of the jets is reduced from well over 130 decibels immediately inside the doors to a level suitable for holding conversation, immediately outside the doors.

The doors are essentially two single or double leaf doors separted by a dead air space which reduces the intensity of the sound. Those at Orenda are 10 ft high with two 5-ft wide panels. The smaller personnel doors leading into the control rooms measure 7 ft by 3 ft. All are easily opened by hand. *From a release of Jamison Cold Storage Door Co., Hagerstown, Md.*



Test cell doors in tandem reduce noise from turbo-jets to level suitable for conversation immediately outside doors.

Vinyl Liner Solves Problem of Storing Alum Solution

To prevent leakage of corrosive alum solution used for water purification at Elizabethtown Water Co. Consolidated, N.J., flexible vinyl liners were tailored for two 8000-gal tanks. Installation time was under 2 hr. (From Bakelite Review, published by Union Carbide Plastics Co., Div. UCC., New York, N.Y.)

Diamond Drills Remove Concrete

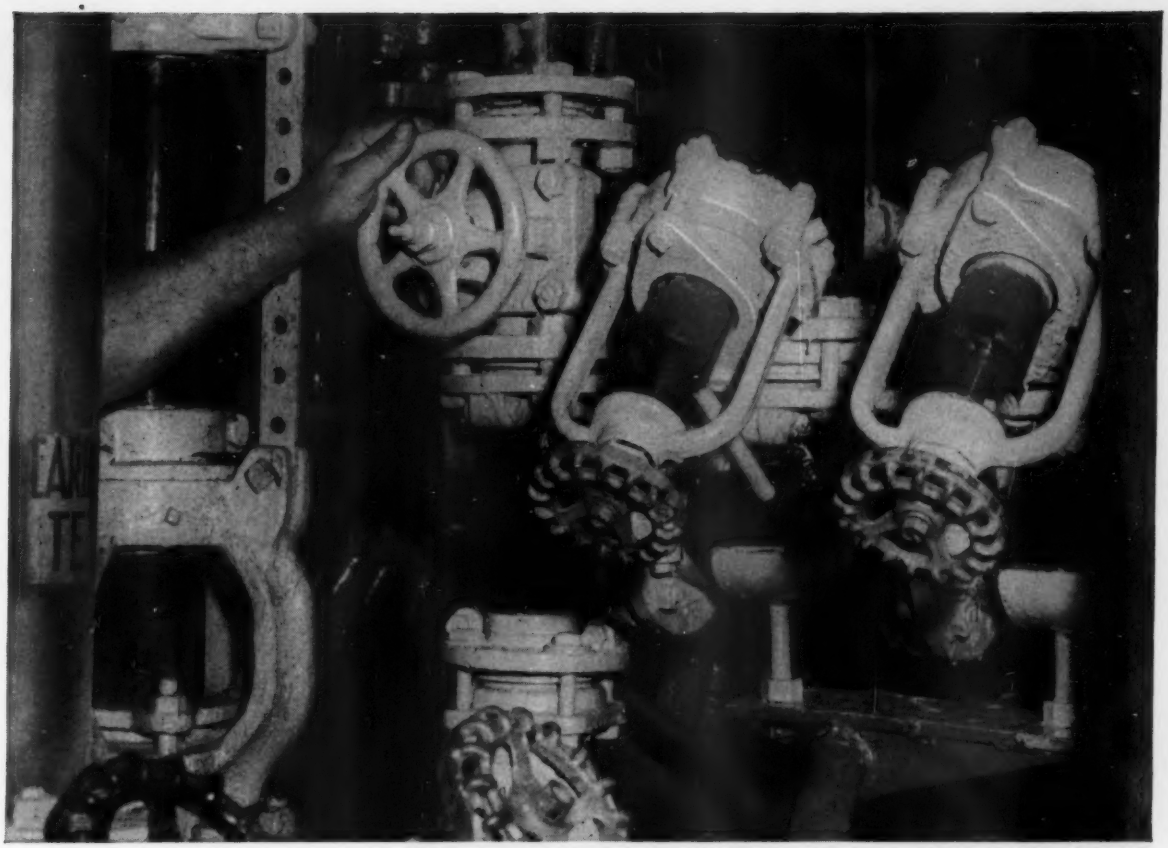
PROVIDING a large hole in the reinforced concrete floor of a Minneapolis food plant, for the installation of a vacuum air cleaning system, without disrupting plant operations or the sanitary conditions, was the problem faced by the plant's management.

The reinforced floor was 11½ in. thick. The hole had to measure 6 ft 1 in. in diam and this required the removal of two tons of concrete.

Diamond drilling technique was used by the Midwest Diamond Core Drilling Co., Minneapolis, to drill the hole without creating dirt or unsanitary conditions. A portable diamond drilling machine with diamond bits was used. The constant circulation of water at the point of drilling not only lubricated the diamond cutting edge and flushed away cuttings, but eliminated dust and kept debris from the air.

The two ton core had to be supported during the drilling and lowered to the floor below after the last peripheral cut had been made. To do this, the drilling contractor installed an overhead pipe and timber rig with a block and tackle. The first hole was then drilled in the center of the core area, a chain was passed

(Continued on page 44)



THE INSIDE STORY OF 40 MONTHS RESISTANCE TO CORROSIVE ACIDS

Here's still another "proved-in-action" case history of Penton*—the new thermoplastic polymer with exceptional resistance to corrosion at elevated temperatures.

THE CHALLENGE: The highly corrosive chemical processing installation pictured above. In the heart of this complex of valves and piping made of Haveg, glassed steel, porcelain and Pyrex, is this Hills-McCanna diaphragm valve with a cast iron body *lined with Penton*. Mounted above a glassed steel vessel used for hydrocarbon chlorination, it is continuously exposed to carbon tetrachloride, hydrochloric acid, and wet chlorine at temperatures up to 85°C.

THE RESULT: Right at home with these expensive corrosion resistant materials, this low-cost Penton valve first placed in service September 29, 1955, has operated *without a single failure for over forty months.*

Now you can get valves, pipe and fittings, pumps and meters, flame-sprayed or whirl-sintered parts protected by Penton. Whether you make or use processing equipment, we'll be glad to send you "The ABC's of Penton for Corrosion Resistance", and the technical brochure on Penton's properties and uses. Just write:

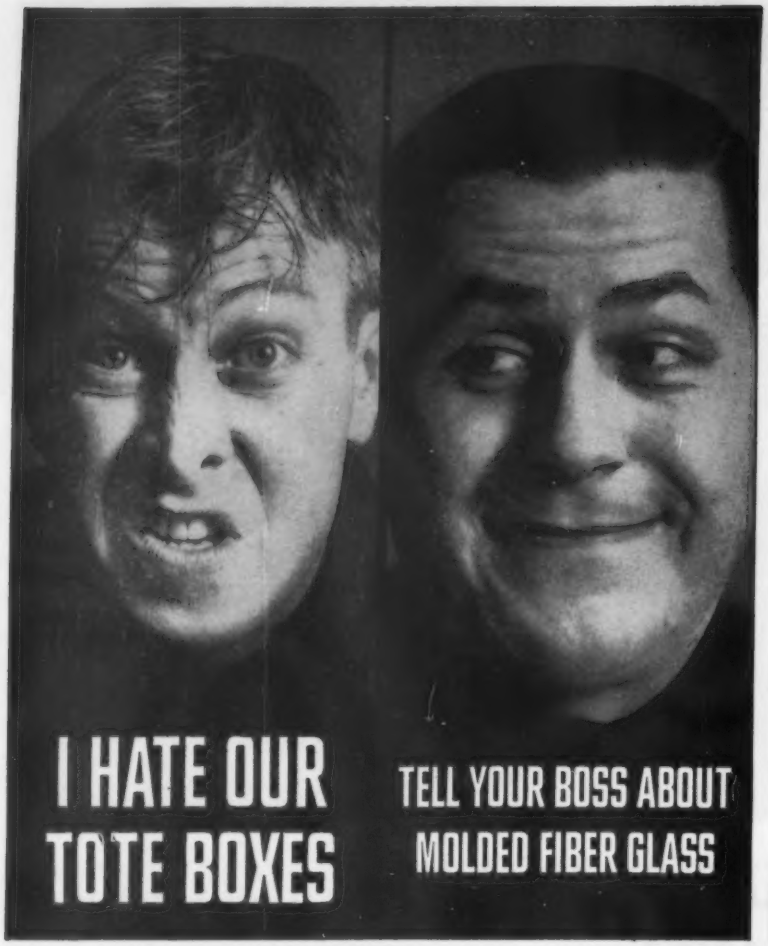
This Hills-McCanna diaphragm valve in service without failure since 1955 has a cast iron body and a Penton lining. Hills-McCanna also makes Penton-lined valves with aluminum bodies, and the same type valve with a solid Penton body.

Hercules Registered Trademark for Chlorinated Polyether

CP59-3

HERCULES POWDER COMPANY
INCORPORATED
900 Market Street, Wilmington 99, Delaware

For more facts circle 527 on Reply Card



Yesterday again I cut my finger on a torn edge. And last week I had to scrap nine of them! . . . too many dents and bent sides. Boy, what I'd give for a box that would last at least a year . . . and wouldn't weigh a ton! Brother, I hate our tote boxes!

Tell him that now there are tote boxes that can't crack, can't rust, and can't tear at the edges. They're made of molded fiber glass, that's why . . . with wire reinforced edges. They're so strong you can jump on 'em without making a dent . . . but still real light to lift! Molded fiber glass, that's the ticket in a tote box. Saves lots of money.

No Maintenance • No Repainting • No Repairing, with "TOTELINE" TOTEBOXES of MOLDED FIBER GLASS

- Hold shape indefinitely
- Featherlight—but tough
- Heat-proof, chemical proof
- Clean easily • Seamless
- Stack conveniently
- Many sizes—many colors

TOTELINE

MOLDED FIBER GLASS TRAY COMPANY

LINESVILLE, PA. Offices in principal cities and Canada MF-59-01

WORLD'S LARGEST PRODUCER OF REINFORCED PLASTIC TRAYS AND TOTE BOXES

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PLANT ENGINEERS' DIGEST

(Digest begins on page 40)

through and looped around a four-by-four timber and the piece that was to be the core was fastened to the supporting rig. A tarpaulin was suspended below the core area to catch any debris.

Running at 350 rpm, the drill cut 66 overlapping holes required to make the edge of the core. Easy movement of the portable unit made possible an average hole-to-hole set-up time of four minutes per hole, using three-inch and four-inch OD diamond bits. Actual drilling time through the 11½-in. floor was eight minutes per hole.

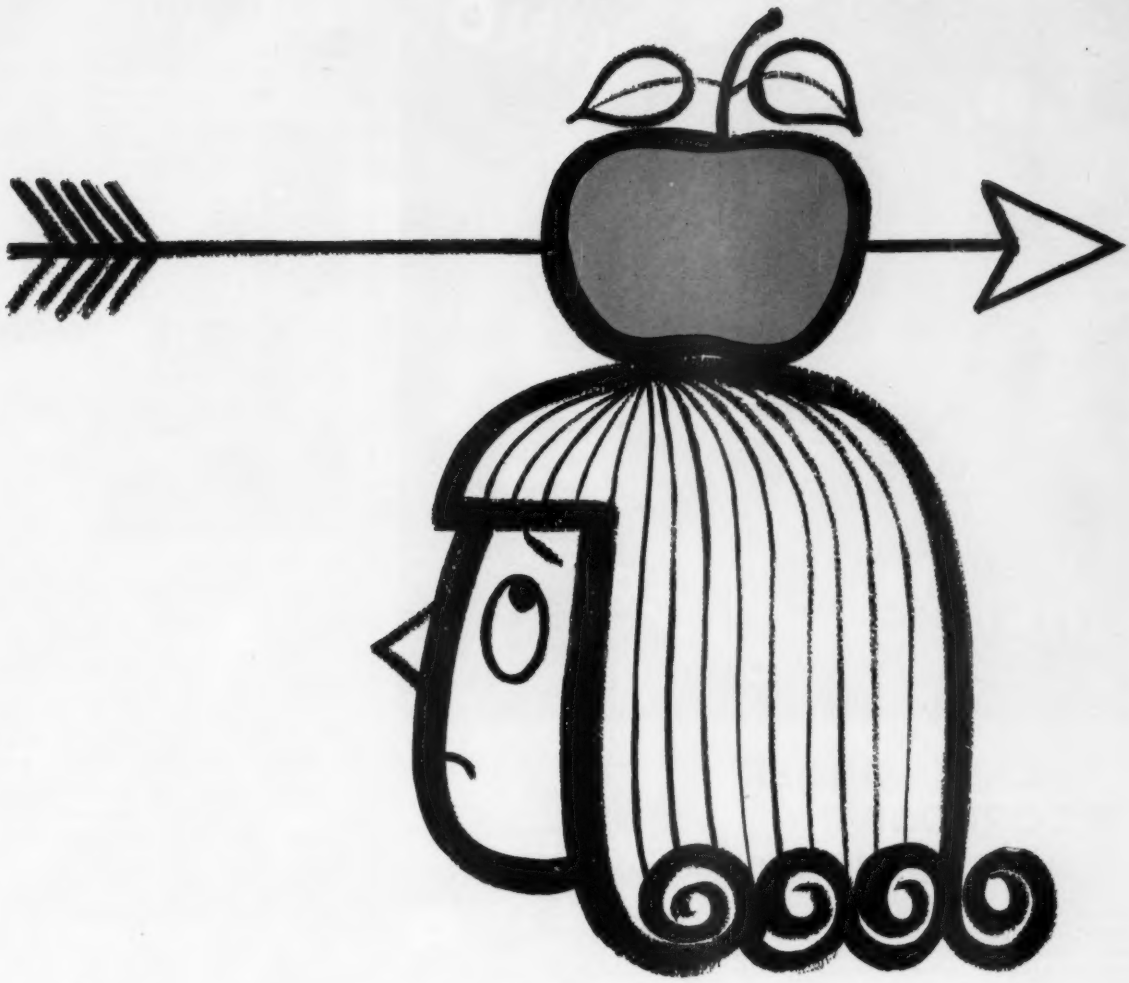
The entire job was finished in 24 working hours and the hole was ready for the installation crew in three days. Although heavy reinforcing steel bars had to be cut through in every hole, the job consumed only two bits. *From a release of Truco Masonry Drilling Division, Wheel Trueing Tool Company, Detroit, Mich.*

Meters Cleaned Quickly

Meter parts that have been ultrasonically cleaned are lowered into neutralizing liquid. Method takes seconds or minutes compared with the former time-consuming hand scrubbing. (From Union Electric News, published by Union Electric Co, St. Louis, Mo.)

Use of Aluminum Cable Cuts Installation Time

HIGH VOLTAGE aluminum cable to be used for feeder circuits in a 12 kv ungrounded neutral system has been



It pays to rely on a specialist...

Even good oils and greases can miss the mark without the skill and experience that come with a Mobil Program of Correct Lubrication

More and more manufacturers are discovering what lubrication can do . . . *in the hands of a specialist!*

And there's only *one* lubrication specialist with so much background experience protecting and serving industry . . . Mobil!

With a Mobil Program of *Correct Lubrication* you get far more than just oils and greases. You get the services of a Mobil lubrication engineer who works closely with your plant engineer. He will set up a lubrication timetable for every machine in your shop. He'll make cost-cutting lubrication maintenance recommendations . . . provide laboratory service when needed . . . even initiate in-plant training courses for your plant personnel.

These services are just a part of this comprehensive program. Together they can sharply reduce manufacturing costs, improve production.

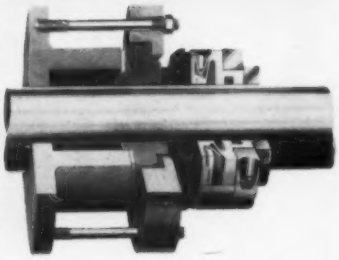
Why rely on "hit or miss" lubrication when you can call on a specialist who can draw on over 93 years of experience. Make it Mobil Correct Lubrication . . . the *profitable* way to protect your plant.

Mobil **Correct Lubrication**

Another reason you're Miles Ahead with Mobil

For more facts circle 561 on Reply Card

LAST LONGER IN CORROSIVE CHEMICALS



Garlock Chemiseal® Mechanical Seals possess greater immunity to corrosion and are more economical than any other design offered. This reputation is based on fact—customers report unsurpassed performance on applications like these:

- **Pumping HYDROXYACETIC AND SULFURIC ACID**
  1750 rpm, 1½" shaft. 10 lbs. suction, 60 lbs. discharge. Temperature of medium 30° C. RESULT: Chemiseal greatly extended service life.
- **HIGHLY ABRASIVE SERVICE (ESTER—10% SOLIDS SLURRY)**
  3600 rpm. 625 lbs. discharge, 30 lbs. suction. Stuffing box pressures 15 lbs. to 65 lbs. Temperature of medium 70° C. RESULT: Chemiseal gave longer, leak-proof operation.
- **Pumping CONCENTRATED SULFURIC ACID**
  1750 rpm. 1 3/16" shaft. 2 lbs. suction. 45 lbs. discharge. Temperature of medium 65° C. RESULT: Chemiseal gave longer life.
- **Pumping ADIPIC ACID AND HYDROCARBON SLURRY**
  1750 rpm. 1⅛" shaft. 35 lbs. suction, 75 lbs. discharge. Temperature of medium 70° C. RESULT: Chemiseal lasted longer, cut downtime.

Join the list of satisfied users. You can apply standard Garlock Chemiseal Mechanical Seals to all pump shafts from ⅞" to 2⅛". Special sizes also available. They seal against all mediums—including solids in suspension—in pressures to 100 psi at 75° C, or 75 psi at 100° C. Chemiseal Mechanical Seals are another of the Garlock 2,000 . . . two thousand different types of gaskets, packings, and seals for every need. Find out complete details by contacting your local Garlock representative, or write for Catalog AD-164.

THE GARLOCK PACKING COMPANY, Palmyra, N. Y.

GARLOCK

Packings, Gaskets, Oil Seals, Mechanical Seals, Molded and Extruded Rubber, Plastic Products

Canadian Div.—The Garlock Packing Co. of Canada Ltd. • Plastics Div.—United States Gasket Co.

For more facts circle 530 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 40)

Adhesive is applied to tee-splice of cable during feed circuit installation.

installed at the U. S. Naval Industrial Reserve Ordnance plant at Sunnydale, Calif.

More than 26,500 ft of 500 MCM aluminum power cable, butyl insulated, aluminum shielded and neoprene sheathed, were used to complete the circuit. The main feeder was 750 MCM aluminum conductor.

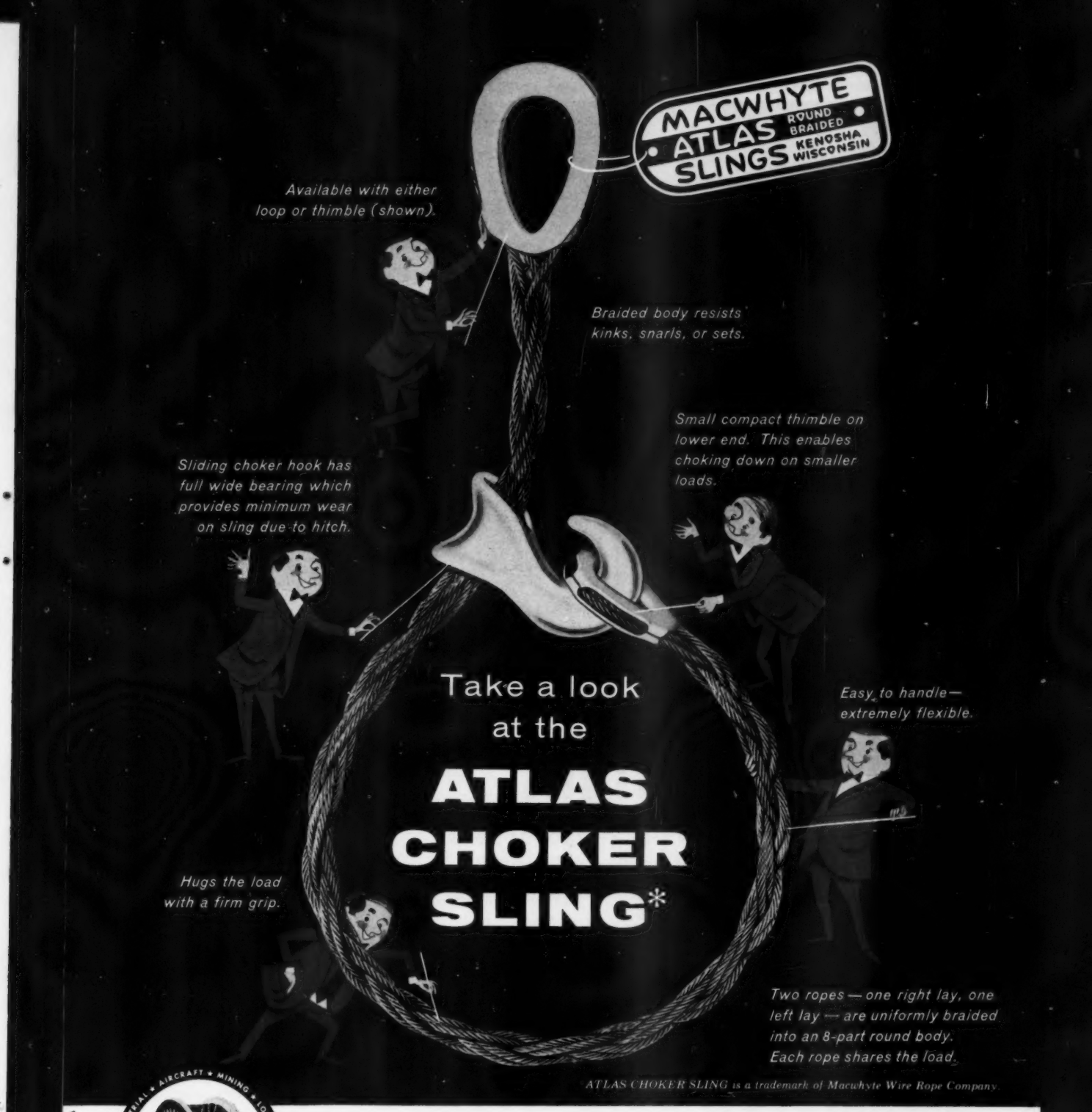
The cable, which is 50 per cent lighter than standard cable, made installation easier, which resulted in a 10 to 15 per cent saving in man hours. Small lift trucks were used for moving the 60-in. spools.

Longest pull was 1085 ft between the plant's rectifier station and a manhole in the Navy building. A total of 180 splices were required for the whole job and these were protected with ozone-resisting neoprene tape, covered by friction tape and a coating of waterproof paint. Terminations were made on switchgear equipped with compatible aluminum terminals. *From a release of Kaiser Aluminum and Chemical Corp., Oakland, Calif.*

Stair Safety Criteria

ON THE PREMISE that a comfortable stairway is a safe stairway, Dow Texas Div. of Dow Chemical Co. has adopted the following design criteria:

1. Establish 45 deg as maximum permissible slope of a stairway, with 40 deg as preferred maximum and


MACWHYTE
ATLAS
SLINGS
ROUND
BRAIDED
KENOSHA
WISCONSIN
Available with either loop or thimble (shown).
Braided body resists kinks, snarls, or sets.
Small compact thimble on lower end. This enables choking down on smaller loads.
Sliding choker hook has full wide bearing which provides minimum wear on sling due to hitch.
Take a look at the
ATLAS CHOKER SLING*
Easy to handle—extremely flexible.
Hugs the load with a firm grip.
Two ropes — one right lay, one left lay — are uniformly braided into an 8-part round body. Each rope shares the load.

ATLAS CHOKER SLING is a trademark of Macwhyte Wire Rope Company

Macwhyte Atlas braided slings are readily available in a variety of standard types and assemblies. If you have a *special* load-handling requirement, we will furnish Atlas Slings to your design . . . or Macwhyte engineers will gladly give you their design recommendation. There's a Macwhyte representative close by. Ask for your free copy of sling circulars 5308R and 5886.

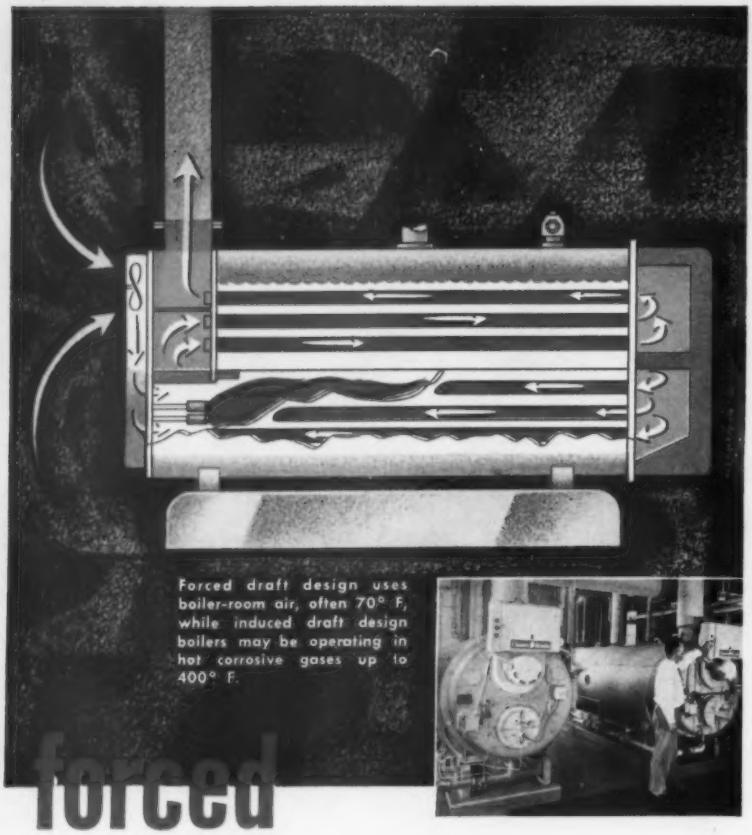
156

MACWHYTE Wire Rope

2900 FOURTEENTH AVENUE • KENOSHA, WISCONSIN

Manufacturers of wire rope, slings, and cable assemblies. Distributed and stocked throughout the United States

For more facts circle 531 on Reply Card


Forced draft design uses boiler-room air, often 70° F, while induced draft design boilers may be operating in hot corrosive gases up to 400° F.

forced

draft design:

How Cleaver-Brooks packaged boilers use cool air to heat more efficiently

FORCED DRAFT DESIGN PROVIDES positive draft with a vibration-free fan, delivering cool, clean boiler room air for combustion at constant density and volume. Efficient combustion, clean fire and stable flame are assured through air-fuel ratios automatically controlled and balanced for a modulating fire, and to meet varying load demands. No high chimney or large diameter breeching are required; only a simple vent is needed.

Since the forced draft fan moves only cool, clean boiler room air, it is never exposed to the sooting and corrosive effects of hot gases; it requires little maintenance and is lower in initial cost.

4-PASS FIRE TUBE DESIGN squeezes maximum heat out of every fuel unit . . . maintains high flue-gas velocity . . . assures optimum heat transfer.

UPDRAFT CONSTRUCTION with low furnace keeps hottest gases well below water level for safe operation.

5-SQ. FT. OF HEATING SURFACE per boiler hp for top heat transfer, prolongs boiler life, assures greater efficiency and lower maintenance.

This exclusive combination of Design Standards is the key to the superiority of Cleaver-Brooks packaged boilers — 15 to 600 hp, 19 sizes, 130 models; steam or hot water; oil, gas or combination oil/gas fired; parts and service available anywhere in the U.S. and Canada.

For details, contact our representative or write Cleaver-Brooks Company, Dept. F, 364 E. Keefe Avenue, Milwaukee 12, Wisconsin.

Cleaver Brooks

ORIGINATOR AND LARGEST PRODUCER OF PACKAGED BOILERS

For more facts circle 532 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 40)

continue use of the architectural rules of thumb for rise and tread proportion.

2. Establish 30 in. as minimum stair width and 30 in. as minimum landing length.

3. Establish 15 ft as the maximum vertical rise between landings.

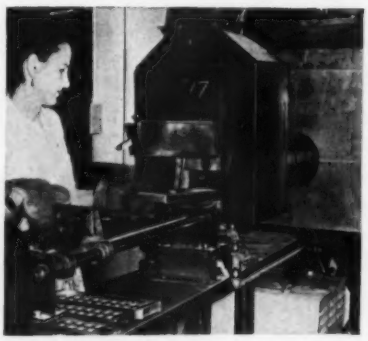
4. Discontinue installation of checkered plate treads.

5. Establish as the minimum acceptable standard the rectangular pattern grating tread of 1-in. by 3/16-in. bars with a checkered plate or perforated plate nosing.

6. In areas of greater than average potential slipping hazard, add to the safety features of the stairway by use of abrasive nosing treads or grating treads completely coated with abrasive material. *From Safety News Letter, Chemical Section, published by National Safety Council, Chicago, Ill.*

Power Input Regulator Controls Temperatures for Sintering

AT THE NORTH CHICAGO plant of Fansteel Metallurgical Corp., heavy duty electrical contacts must

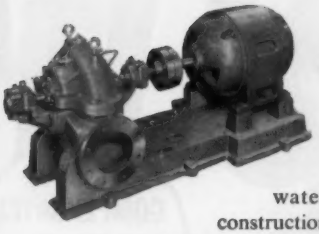


One of two electrical furnaces on which package systems regulate power input for step control of sintering temperature.

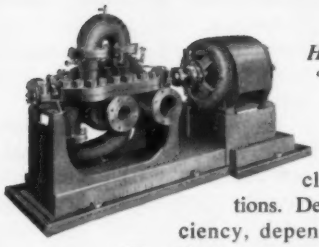
be sintered in a pure hydrogen atmosphere at accurately controlled temperatures ranging from 1000 C to 1800 C.

To solve the critical control problem with precise yet low maintenance equipment, the company recently installed package control systems for power input regulation on two heating zones of the com-

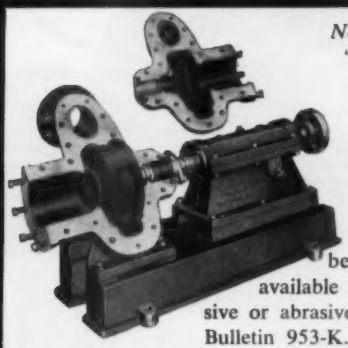
HOW MUCH WILL IT COST YOU



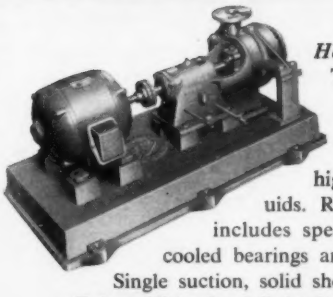
Clear Water Pumps: "Buffalo" Double Suction Pumps assure maximum efficiency in clear water service. Rugged construction provides long life with minimum maintenance. 10 to 14,000 gpm capacities. Write for Bulletin 955-R.



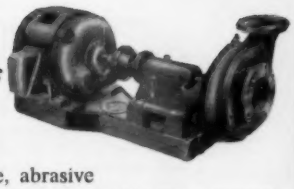
High Pressure Pumps: "Buffalo" Multi-Stage Pumps are ideal for boiler feed and other clear water applications. Designed for top efficiency, dependability, long life. These husky pumps operate against heads as high as 1500 ft., in capacities to 900 gpm. Write today for Bulletin 980-D.



Non-Clogging Pumps: "Buffalo" Diagonally Split-Shell Pumps are specially designed for moving high consistency liquids. Down-time, wear and wedging are reduced. Rubber-lined models are available for pumping corrosive or abrasive liquids. Write for Bulletin 953-K.



Heat Transfer Pumps: These special "Buffalo" pumps are engineered for handling high-temperature liquids. Rugged construction includes special alloys, water-cooled bearings and special packing. Single suction, solid shell design is highly efficient. Write for full details.



Chemical Liquid Pumps: These special "Buffalo" Pumps are engineered for severe service in handling most corrosive, abrasive or high consistency liquids. Ten special types are available in a variety of trim. Write for Bulletin 982-A.

NOT TO INSTALL "BUFFALO" PUMPS?

How "Buffalo" Pumps Can Save You Money Right Away: "Buffalo" offers a broad line of pumps. This means you can usually choose the right pump to fill almost every liquid-moving need. With "Buffalo" Pumps you pay only for the type, size and capacity required — no more. This often means substantially lower initial cost.

How "Buffalo" Pumps Can Save You Money Over the Years: "Buffalo" Pumps are engineered for peak hydraulic efficiency. This gives you consistently lower pumping costs.

"Buffalo" Pumps are ruggedly built throughout. Extra heavy-duty components reduce maintenance costs over a longer productive life span. "Buffalo" Pumps are designed for quick, easy access to inner parts. Thus routine maintenance costs are lower. "Buffalo" Pumps feature parts interchangeability. This means further savings in reduced parts inventories.

Your nearby "Buffalo" Engineering Representative will be glad to help you choose the pumps that will most economically fill your needs. Phone him today, or write us direct.

"Buffalo" PUMPS

BUFFALO PUMPS
Division of Buffalo Forge Co.
166 Mortimer St. Buffalo, N. Y.

Canada Pumps, Ltd., Kitchener, Ont. Sales Representatives in all Principal Cities

A BETTER CENTRIFUGAL PUMP FOR EVERY LIQUID

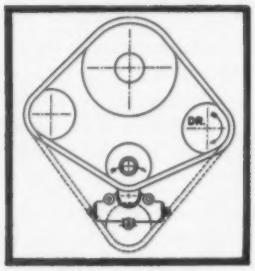
For more facts circle 533 on Reply Card

Whitney

AUTOMATIC DRIVE TENSIONER

Keep your drives operating *without slack* — at peak efficiency — with the Whitney Automatic Drive Tensioner. The Tensioner (patented) is a simple, easily-mounted unit which applies a steady and continuous take-up which reduces whipping and compensates for drive wear on chain, V-belt or flat belt drives. Simply install a sprocket, roller or sheave, which can rotate freely on the crank arm.

The Whitney Tensioner will pay dividends in longer drive life and increased efficiency. Available "off-the-shelf" from your local Whitney Chain distributor.



ADVANTAGES

- Positive action take-up, simple construction.
- Flat base, three bolt installation. Position or location easily changed.
- Continuous and adjustable spring pressure.
- Crank arm action can be clockwise or counterclockwise.

Write for complete specifications and installation data.

Whitney
CHAIN COMPANY
405F Hamilton Street • Hartford 2, Connecticut

ROLLER CHAIN • CONVEYOR CHAIN • SPROCKETS • FLEXIBLE COUPLINGS • WHITNEY-TORMAG DRIVES

For more facts circle 534 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 40)

pany's electrically heated furnaces.

The control problem was difficult because of several factors: loading and unloading trays of electrical contacts tends to change the furnace temperatures quickly, and by varying amounts; production would be slowed if it took too long to change the temperatures to the sintering point for the various grades, yet overshooting or cycling must be minimized; frequent pulsing of power input relays was undesirable because of resultant extra maintenance.

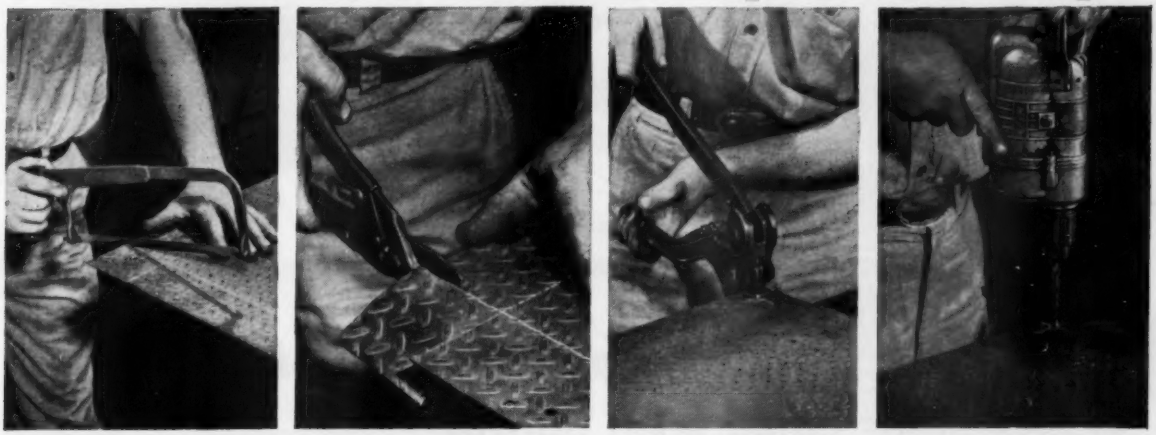
To meet these requirements, recorder controllers with integral current adjusting type electrical controls were used. The systems included three-action control to regulate power input in accordance with the size, duration and speed of temperature deviations. This control holds temperatures within specifications and can raise furnace temperature from 900 C to 1300 C in 16 minutes without overshooting or cycling. Maintenance is held to a minimum because there are no moving parts. *From a release of Leeds and Northup Co., Philadelphia, Pa.*

Mobile Files

Tool design plans are stored in mobile files at Eastman Kodak Apparatus and Optical Div. Two rows of files are placed in front of fixed, rear row, can be moved back and forth as required on special rails. (From a release of Mobile Storage Div., Dolin Metal Products, Inc., Brooklyn, N.Y.)

ORDINARY SHOP TOOLS

can cut, bend, hammer, drill, shape, roll saw, snip



SMALL PATTERN INLAND 4-WAY® SAFETY PLATE

You don't have to spend a penny for special equipment. With just the normal tools available in your plant you can work with Small Pattern Inland 4-WAY SAFETY PLATE—use it for dozens of maintenance jobs.

Small Pattern 4-WAY SAFETY PLATE is only 18 gage, weighs only 2.4 pounds per square foot, yet has all the slip-resistant traction and safety features that has made regular 4-WAY SAFETY PLATE famous. Small Pattern 4-WAY costs less to use—less per square foot covered—than other similar materials.

It's tough, rugged, built for years of wear, yet it is light and flexible enough to carry wherever needed—work into any required form. Try it. It's firesafe, non-absorptive, easy to keep clean—the ideal material for fast, easy, low-cost maintenance use.

a few of the ways you can use light gage Safety Plate:

kick plates
tool racks
wall covering
treads on wood steps
round or square column protectors
thresholds
truck beds
resurfacing
machines tool tables
covering over worn cement stairs

AVAILABLE FROM YOUR STEEL SERVICE CENTER in 18 gage, cut to your needs in widths up to 42″ and lengths up to 152″.

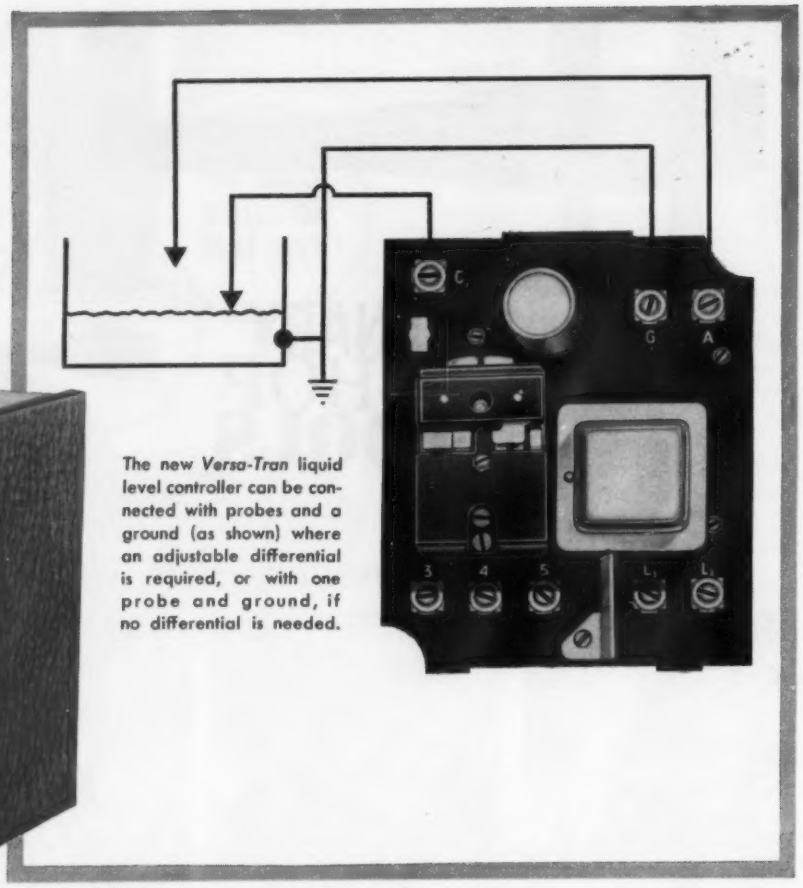
AMERICAN STEEL WAREHOUSE ASS'N.

INLAND

4-WAY SAFETY PLATE
® Registered U. S. trademark

INLAND STEEL COMPANY
30 West Monroe Street, Chicago 3, Illinois

For more facts circle 535 on Reply Card



The new *Versa-Tran* liquid level controller can be connected with probes and a ground (as shown) where an adjustable differential is required, or with one probe and ground, if no differential is needed.

New low cost, high precision VERSA-TRAN® simplifies liquid level control

Here's a simple, easily-installed electronic controller that accurately controls the level of any electrically conductive liquid with a measured impedance not exceeding 25,000 ohms, measured at the probe-type sensing element. Its features include:

- Unique, fully transistorized design which eliminates need for field adjustment and calibration.
- Choice of fixed or adjustable differential by use of either one or two probes.
- Wiring between relay and probes can be ordinary 18 gauge, 2-conductor cable.
- No floats or standpipes necessary.
- Relay can be flush mounted, surface mounted or mounted in most electrical enclosures.
- All components zinc-chromate treated for corrosion resistance.

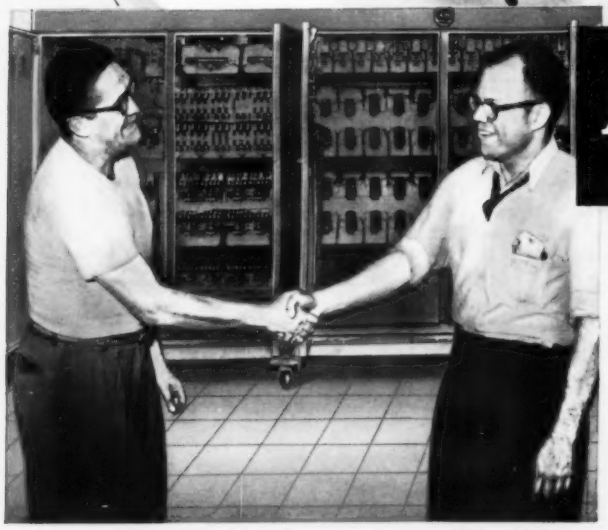
Your nearby Honeywell field engineer can help you profitably apply the new *Versa-Tran* liquid level controller. Call him today . . . he's as near as your phone.

MINNEAPOLIS-HONEYWELL, Wayne and Windrim Avenues, Philadelphia 44, Pa.

Honeywell

First in Control

Precision Guidance of Nearly a Mile of Plate Glass...



A series of control panels such as this is used in the Pittsburgh Plate Glass cutting room. Above are shown the Allen-Bradley engineers after completing the factory testing of the final panel.

controls by ALLEN-BRADLEY of course!

The New Pittsburgh Plate Glass Plant at Cumberland, Maryland, heralds a new era in the art of plate glass making. Night and day, a continuous ribbon of glass is fed to a nearly mile-long process line. Then a complex control system directs the automatic cutting, sorting, and conveying of the glass to six areas, according to a continuously varying program.

Special control panels which integrate portions of this equipment into a unified, smoothly operating system were designed, developed, and engineered by Allen-Bradley. You can benefit by this extensive control experience . . . it is a "plus" value when you specify Allen-Bradley *quality* motor control.

Allen-Bradley Co., 1316 S. Second St.
Milwaukee 4, Wis.
In Canada: Allen-Bradley Canada Ltd., Galt, Ont.

See on the next page how A-B Controls do it... →

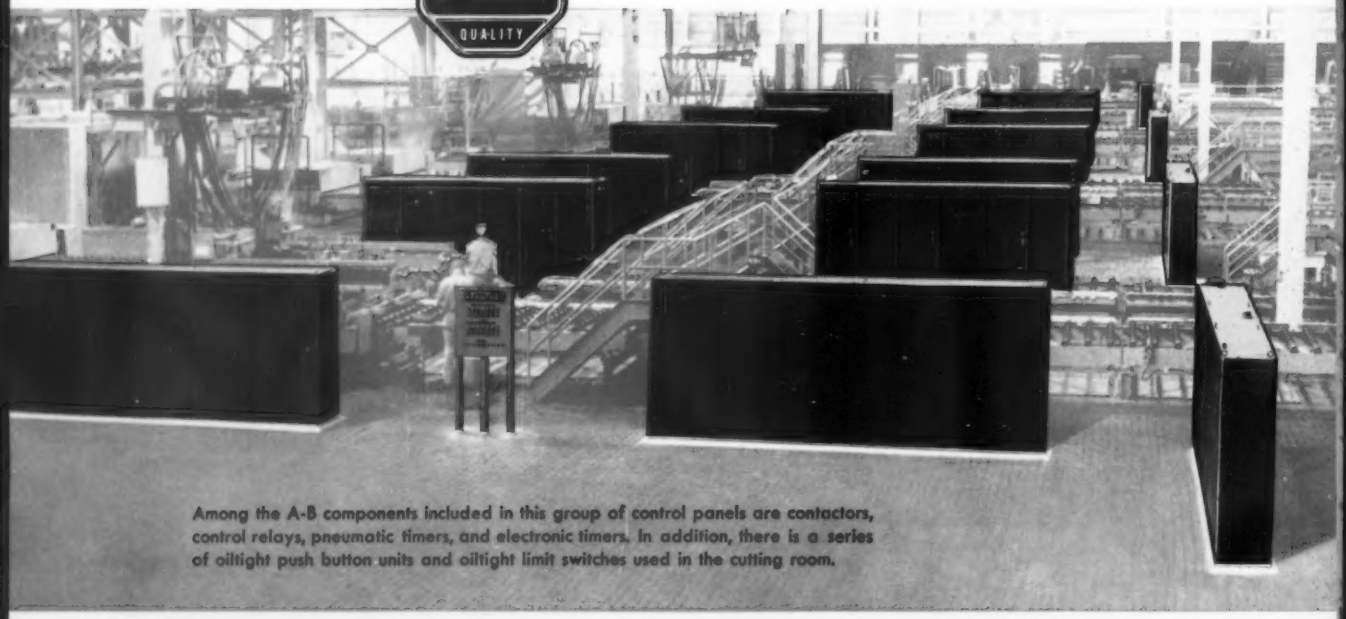
5-59-MR

Plate Glass made by the mile

with reliable ALLEN-BRADLEY Controls

A-B QUALITY

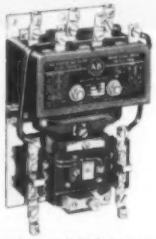
In the cutting room at Pittsburgh Plate Glass (below), Allen-Bradley controls prove the reliability of their "simple design." All A-B solenoid starters, contactors, and relays have only ONE moving part . . . assuring *millions* of trouble free operations. There are *no* bearings or jumpers to cause trouble. Contact maintenance is also eliminated—A-B double break, silver alloy contacts remain in perfect operating condition until completely worn away. Insist on Allen-Bradley *quality* motor controls . . . you cannot do better!



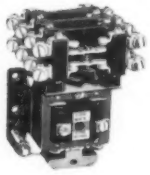
Among the A-B components included in this group of control panels are contactors, control relays, pneumatic timers, and electronic timers. In addition, there is a series of oiltight push button units and oiltight limit switches used in the cutting room.

Some of the standard components which are used in this plant

Contactor—Bulletin 702, Size 3 shown. Made up to Size 8, rated 1350 amps, 220-550 v.

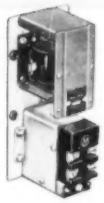


Solenoid Starter Bulletin 709, Size 2 shown. Made in ratings to 450 hp, 220v; 900 hp, 440-550 v.



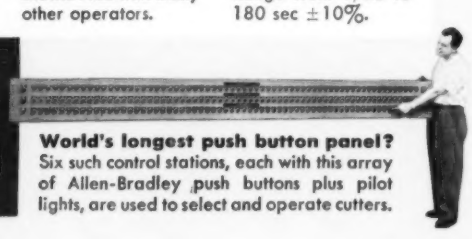
Control Relay—Bulletin 700. Universal type relay with both N.O. and N.C. contacts shown.

Limit Switch—Bulletin 802T. Oiltight roller lever type shown. Also with many other operators.



Pneumatic Timer Bulletin 849 for on-delay or off-delay. Range from 1/20 to 180 sec ±10%.

ALLEN-BRADLEY
Quality Motor Control



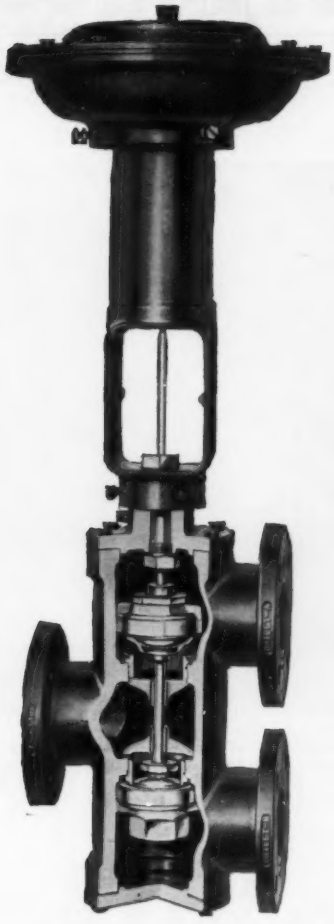
World's longest push button panel? Six such control stations, each with this array of Allen-Bradley push buttons plus pilot lights, are used to select and operate cutters.

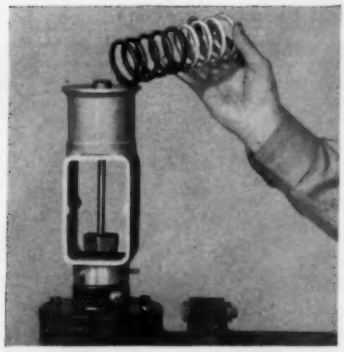
Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis.
In Canada: Allen-Bradley Canada Ltd., Galt, Ont.

5-59-MR

SAVE OVER 50% ON MAINTENANCE TIME!

New Design Simplifies Replacement of Discs and Seat Rings





1. While valve remains installed, top and spring assembly are removed.

2. Bottom cap and lower disc holder are removed.

3. Upper disc holder assembly is then lifted out.

4. New seat rings are inserted inside body, new discs installed and parts reassembled.

THIS NEW THREE-WAY BY-PASS VALVE OUTPERFORMS, OUTSAVES THEM ALL!

Less than half the usual time is needed to replace discs and seat rings and renew the life of this new Three-Way By-Pass Valve by Johnson.

Designed for the accurate control of liquid flow, the unique construction of the valve greatly simplifies maintenance and eliminates the need to remove the valve body from the line for servicing. The result is a 50 per cent or greater saving on maintenance time! Even more important in many cases is the reduction in down time and speedy restoration of service.

And that's just one advantage of this exclusive new development for Johnson Pneumatic Control Systems. Compare the other improved features at right with what you are now getting. Mail the coupon for complete details or call your local Johnson branch.

- **100% tight shutoff**—in many diverting applications one valve can now do the job where formerly two were needed. You save the cost and time of installing a second valve.
- **Body design allows simple, straightaway piping**—for faster, easier, less costly installation.
- **Both discs seat against flow**—eliminates slamming and water hammer.
- **Proportional or two position action.**
- **Sizes**—2½ to 6 inches.
- **Pressures**—Up to 250 psi at 406 F.

JOHNSON SERVICE COMPANY
507-B East Michigan St., Milwaukee 1, Wisconsin

Please send me Bulletin Nos. V-210 and V-211 describing your new Three-Way By-Pass Valves.

Name & Title_____

Firm_____

Address_____

City & State_____

JOHNSON CONTROL

PNEUMATIC SYSTEMS

DESIGN • MANUFACTURE • INSTALLATION • SINCE 1885

For more facts circle 538 on Reply Card

← For more facts circle 537 on Reply Card

OPERATION AND PRODUCTION —pointers for the industrial plant engineer

Edited by Vern Kempf

Gas Infrared Concrete Curing Doubles Use of Concrete Forms

CONCRETE FORMS can now be used at least twice a day instead of once at Fifer Industries, Inc., Louisville, Ky., by using gas infrared heat to cure molded concrete products. After forms are poured, one or more portable propane-fired infrared generators are moved into place for curing and are adjusted to radiate over the entire top surface of the forms.

Heat curing has cut in half the number of forms required for ordinary production requirements and will allow expansion of output without the necessity for buying additional forms.

The heaters were manufactured by Perfection Industries, a division of the Hupp Corporation. They will operate for about 70 hours on a 100 lb cylinder of propane costing about $8. The heaters produce 24,000 Btu's per hour.

Operator adjusts radiation pattern from portable propane-fired infrared gas heaters to speed up drying of concrete to permit rapid re-use of concrete forms.

Tungsten Carbide Hard Facing Reduces Wear on Drill Pipe Couplings

HARD FACING with tungsten carbide particles has been made a production-line process in the Toledo, Ohio plant of The National Supply Company. The need for a production scale process arose from the high rate of wear on drill pipe couplings during the drilling of deep oil wells. A rotating drill string may penetrate thousands of feet of sand and rock and the couplings will wear most from the abrasion because of their larger diameter.

In the new process, tool joints move on a conveyor through an induction heater which raises their temperature to 750 to 800 F. One of two operators of two identical automatic arc welding machines then clamps a preheated coupling

(Continued on page 58)

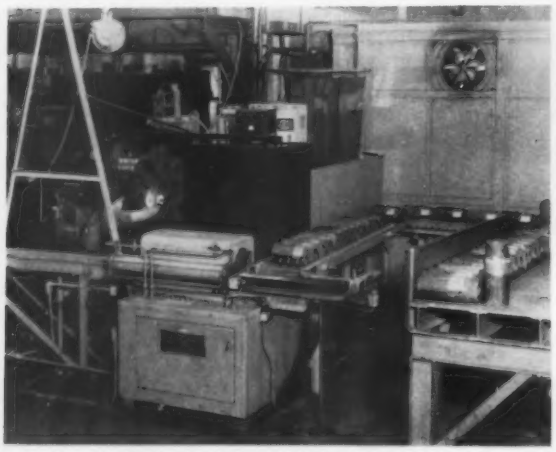


Fig. 1. After passing through induction heater, couplings are positioned in the fully automatic hard facing machine.

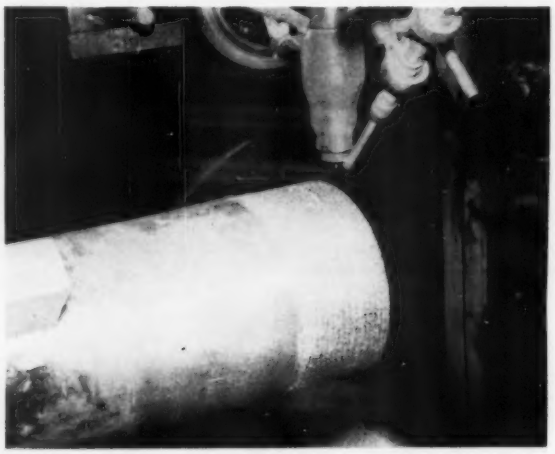


Fig. 2. Close-up of coupling after hard facing. Tungsten carbide particles flow down tube onto the molten metal.

quickest TO ERECT

quickest TO INSTALL

quickest TO RE-ARRANGE

quickest TO PAY FOR ITSELF

DELUXE STEEL SHELVING

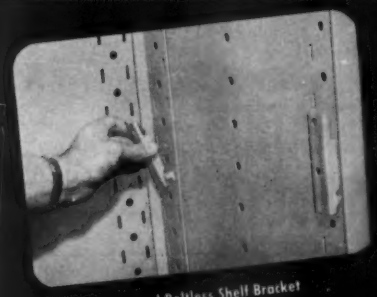
quickest BECAUSE . . .

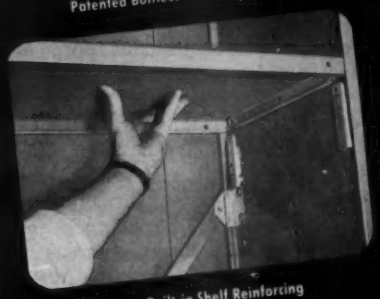
. . . you realized that a shipment of knockdown shelving parts has no useful value. It must first be assembled into shelving racks for storage utility. The faster these racks are erected, the lower your installation cost. So, because Deluxe steel shelving is erected the quickest, your *installed cost* is the lowest.

The film strip shows 6 engineering features of Deluxe steel shelving that promote quickest erection. Take the patented Deluxe boltless shelf bracket . . . it replaces 90% of the time-consuming nuts and bolts and allows not only quickest installation, but easy shelf adjustment.

THE PROOF: At 1958 trade shows, two untrained girls erected a complete closed section of Deluxe Boltless Steel Shelving in *less than 5 minutes.*

Call your local Deluxe dealer or write for the new, complete Deluxe Shelving Catalog No. 30.


Patented Boltless Shelf Bracket


Factory Built-in Shelf Reinforcing

One-piece Bin-type Upright

Snap-in Dividers (horizontal & vertical)

Clip-on Bin Fronts

Bottom Shelf Support and Floor Angle

DELUXE

DELUXE METAL FURNITURE COMPANY · Warren 7, Pa.

A Division of the Royal Metal Manufacturing Company

For more facts circle 539 on Reply Card

OPERATION — PRODUCTION

(O and P begins on page 56)

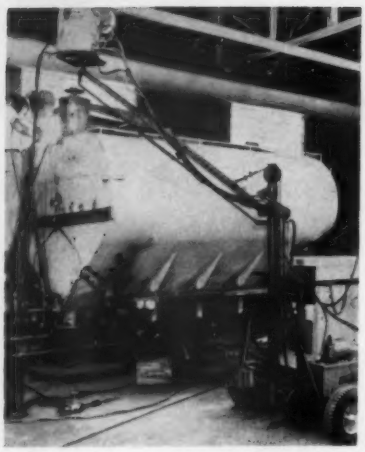
in a three-jaw lathe chuck, aligns the ⅛-in. non-consumable thoriated tungsten electrode, and presses a button that closes the electrical circuit to strike an arc.

Helium shielding gas then starts flowing at 40 cfh. As soon as the surface metal melts, the operator starts rotation of the coupling and the flow of tungsten carbide particles from an overhead vibrator down through the tube behind the arc. After a single revolution of slightly more than 360 degrees, the welding head indexes lengthwise two-thirds of a bead width to make another pass.

The new process eliminates a complex grooving operation formerly required and deposits 100 per cent tungsten carbide instead of only 60 per cent obtainable with the former open arc process.

Boom Lifts Welder to Work Area

A COMPACT carrier-cart equipped with a boom to move welding control and wire-feed unit to the weld area has been introduced by the National Cylinder Gas Division of Chemetron Corporation, Chicago, Illinois.



Boom raises welding controls and wire-feed unit to position next to operator.

Raised and lowered by a hand-operated hydraulic pump, the boom can be adjusted to heights from four to 14 ft and rotates through 360 degrees. The unit provides improved welding flexibility for large maintenance operations and is useful in shops with limited crane service.

Mounted on three balloon-type tires, the hand-propelled cart can carry welder, water coolant unit and two standard cylinders. It is designed to move equipment needed for shielded-arc welding processes from one location to another.

Simple Moisture Test Prevents Paint Failures

Contributed by S. CLARK, Maintenance Supt., U. S. Phosphate Co.

PLANT ENGINEERS know that moisture under a painted surface will lead to eventual failure of the paint film and resultant additional work to prepare the surface again. The presence of moisture should be checked whenever a surface is suspected. This is particularly true of wall surfaces below grade.

To determine if a surface is free of moisture we make a simple test by placing a 10-in. square of clear plastic against the surface and seal it on all four sides with a good adhesive tape. If the plastic is still dry on the surface against the wall after 48 hours, it is safe to let the painters come in. If moisture shows on the patch, it is best to raise the temperature and reduce the humidity in the room and make another test several weeks later.

Coating Reduces Carton Damage

UNEVEN FLOORS and emergency stops with heavily loaded fork lift trucks has proved to be the downfall of many a stacked pallet at the Miller Brewing Company, Milwaukee, Wis. While automatic palletizers and other modern methods of material handling used are vital to present day production rates, they are also partially responsible for an increasing amount of goods being damaged before reaching the customer.

To reduce man-hours employed cleaning up and restacking spilled loads, an investigation was undertaken of skid resistant inks. While helping to reduce slippage, the inks were somewhat dull in appearance and susceptible to smearing.

To help in selecting a better product, the company developed its own machine for testing skid resistance. Simple but effective, the device has a platform on which containers can be piled on top of one another. The platform is then gradually tilted until slipping takes place, at which time the angle of incline is measured.

In these tests it was found that

Portable Machine Cuts Wire Cable Fast and Neat

CUTTING wire cable used for hoists on overhead traveling cranes is usually done with a sledge hammer and chisel or an oxy-acetylene cutting torch. Both of these methods leave the cable ends in poor condition and complicate the problem of properly securing the strands.

Toggle clamp holds wire rope securely in place while abrasive wheel makes cut.

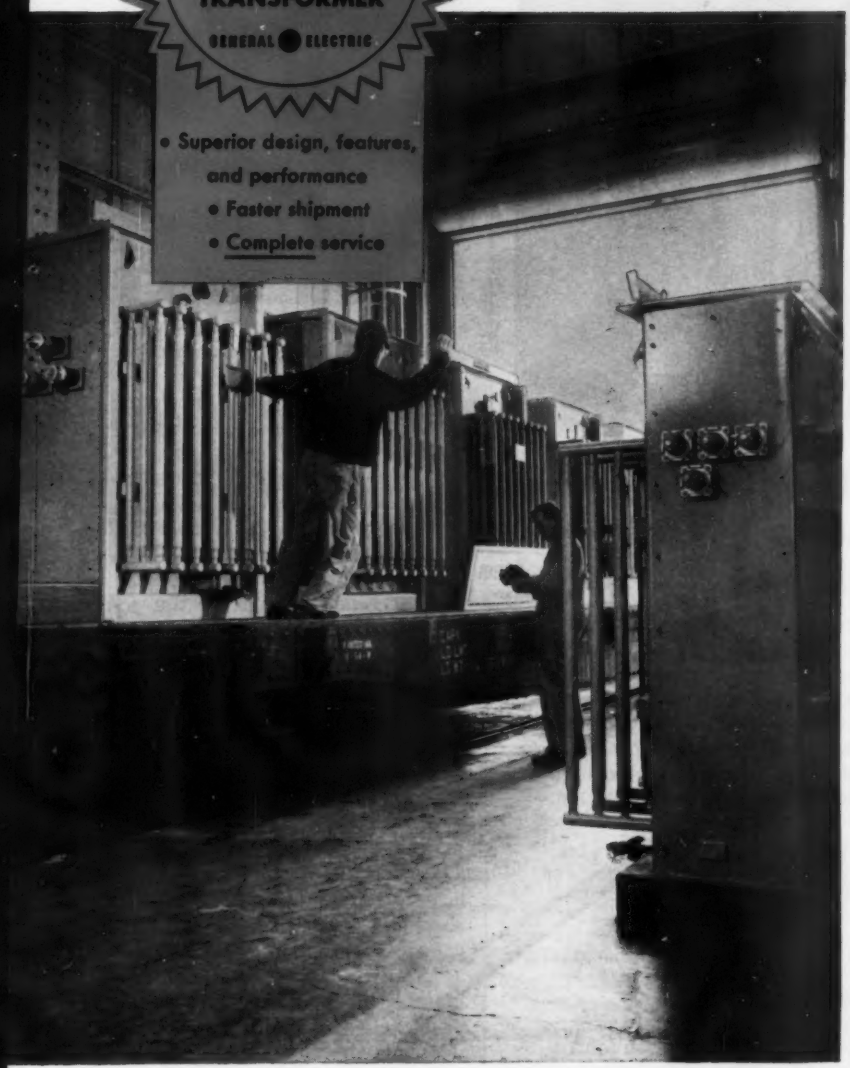
To overcome this problem, a portable machine has been devised by Charles Dominski, a crane repairman at the Allis-Chalmers Manufacturing Company, Milwaukee, Wis. Operated by air pressure, the machine consists of a clamping device, a rubber bonded abrasive cutting wheel driven by an air motor, a wheel guard, lifting cylinder and the necessary control valves.

The lightweight unit can be easily moved around the shop and connected to the nearest air hose. A toggle clamp holds the wire rope securely in an inverted angle while the abrasive wheel makes the cut. The cut ends show little disturbance to the strands.

For more facts circle 540 on Reply Card

FULL VALUE FOR YOUR TRANSFORMER DOLLAR

Pyranol* transformers to 500 kva now shipped direct from G-E stock



Time is money: And, here's how General Electric can help you save both. Now, the five most popular G-E Pyranol filled transformers in ratings 112½-500 kva are carried in factory stock. This means that all tests can be completed and the units shipped to you at least four weeks earlier than before possible.

General Electric Distribution Equipment Transformers—both Pyranol and oil-filled—offer industrial users many performance benefits. Available in either the conventional three-legged core construction (300–500 kva) or the space saving "stacker" type (112½–225 kva), these transformers feature low sound levels and improved pressure-relief devices (Pyranol units).

Faster order handling and shipment plus product leadership are key reasons why you get certified **full value** for your transformer dollar with General Electric's full line of transformers for industry**. But be sure to factor in the complete G-E service provided before, during, and after installation. If you examine the **complete package** offered by General Electric, we're confident you'll recognize G-E superiority.

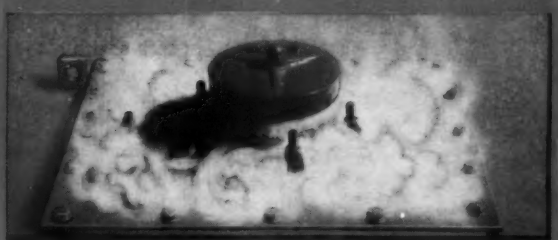
For complete information and application help, see your G-E Apparatus Sales Engineer or Agent today. Or write for descriptive literature to Sect. 417–6, General Electric Company, Schenectady 5, New York.

* Reg. Trade-mark of General Electric Co.

**Medium transformers (501 to 7500 kva), Open dry-type transformers (300 to 7500 kva), Sealed dry-type transformers (300 to 7500 kva), Distribution Equipment Transformers (112½ to 500 kva), Integral Distribution Centers.

Progress Is Our Most Important Product

GENERAL ELECTRIC



SUPERIOR DESIGN, FEATURES, AND PERFORMANCE of full-value G-E transformers is typified by new pressure-relief device on Pyranol filled Distribution Equipment Transformers.

FASTER SHIPMENT through rapid processing of orders . . . computer design . . . repetitive manufacture.

COMPLETE SERVICE . . . application engineers . . . installation engineers . . . 50 nearby service shops.

Four "Bonus Values" Add to the Safety of Acco X-Weld Chain Slings!

• For certain types of lifts, there is one and only one product to use for maximum safety and efficiency... chain! But why only chain? Because chain offers qualities of tensile strength and flexibility not found in any other material. The next time you are confronted with an extra-heavy lifting problem, don't take a chance with a make-shift sling *that may not do the job!* Be sure... with ACCO *Registered* Sling Chains! Only with ACCO *Registered* Sling Chains do you get these four "bonus values" which add materially to the worth, but not the cost, of the sling...

1. **Accoloy X-Weld Chain** for extra strength. X-weld hangs straight... cannot kink... has extra resistance to bending
2. **New Shaped Master Link** is designed to withstand deformation under loads up to 18% greater than round section link
3. **Acco Registration Ring** is serially numbered as evidence that the sling has been proof-tested at twice its working load limit
4. **Registration Certificate** signed by American Chain & Cable Company attests to the field-design of the complete sling

Only ACCO *Registered* Sling Chains, with Magnafluxed-tested hooks, give you premium quality features at regular prices. Find out about them from your nearby ACCO *Registered* Sling Chain Distributor or write us at York, Pa., for full details.

ACCO Registered
CHAIN SLINGS

American Chain Division • American Chain & Cable Company, Inc.
Bridgeport, Conn. • Factories: *York and *Braddock, Pa.
Sales Offices: *Atlanta, Boston, *Chicago, *Denver, Detroit, *Houston, *Los Angeles, New York, Philadelphia, Pittsburgh, *Portland, Ore., *San Francisco
*Indicates Warehouse Stocks

ACCO

For more facts circle 541 on Reply Card

OPERATION—PRODUCTION

(O and P begins on page 56)

Slip resistance of boxboard coatings is tested on this simple testing machine.

cartons treated with Du Pont's Ludox colloidal silica could be consistently tilted to more than 30 degrees before slipping. Untreated cartons usually started sliding at approximately 15 degrees. These coatings can be applied by any boxboard manufacturer and also provide a certain amount of soil retardancy. This has become increasingly important with the lighter colors used on the cartons.

Substitution Box Speeds Tests On Capacitor Type Motors

Contributed by H. JOSEPHS, Maintenance Supv., Sun Shipbuilding Co., Chester, Pa.

INEXPENSIVE and simple to build, a capacitor substitution box can help to reduce the time and effort required to determine the correct value of capacitor needed to replace a defective unit on a capacitor-type motor. This is a particularly vexing problem when an incoming motor does not have the old capacitor with it or if the condenser is damaged and it is difficult to read the original value of capacitance.

Six capacitors, ranging in value from 40 to 281 mfd, 115-v, are each connected in series with a toggle switch so that any one or combination can be connected in parallel with a set of test leads. The suspected capacitor is removed and the test leads replace it for the test.

Closing a single toggle switch or

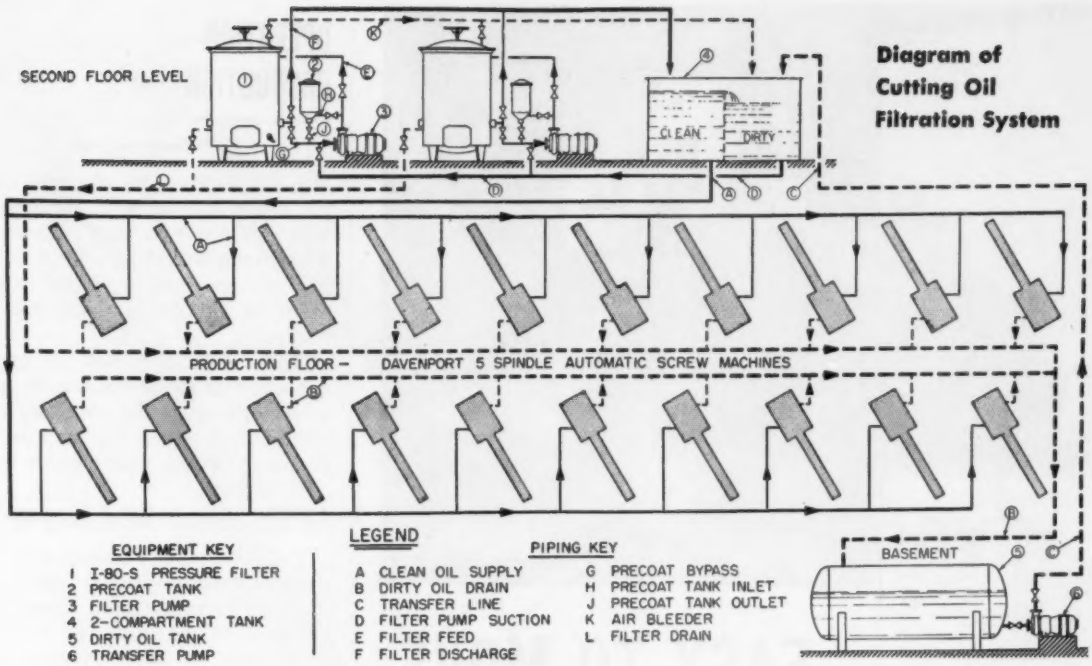


Diagram of Cutting Oil Filtration System

How Maximation Eliminates Hidden Machine Costs

. . . at the Teale Machine Company

By: H. L. Gaudriot, President
Teale Machine Co.

More than any other factor, high costs have been responsible for introducing a new efficiency concept in plants producing screw machine products. This reduction of operating expense with an increase in profits is termed MAXIMATION – getting maximum production from machine tools by eliminating hidden costs.

Responsibility Placed On Oil

At our plant in Rochester, N. Y., dirty cutting oil was preventing the plant's 24 Davenport 5 spindle automatic screw machines from functioning at their designed efficiency. Metal chips, solid abrasives, grit, dirt and fine particles in the oil stream were responsible for numerous extra costs. These included frequent down time for tool grinding and sump tank cleaning, shorter useful life of oil, poor product finish, many rejects and excessive maintenance. In addition, oil spillage created a waste and housekeeping problem. Handling of oil barrels was expensive, hazardous and untidy. To remedy the situation, the Teale Co. installed a complete Hoffman Central Pressure Filter System for reconditioning all cutting oil before it reached the automatic machines.

How Filters Operate

The central pressure filtration system includes 2 Hoffman Model I-80 S pressure filters with pre-coat tanks, chip wringers and motor driven pumps. Gravity flow through header pipes and lead-off lines delivers clean oil to each screw machine. As dirty oil enters the filter under pressure, it is filtered through a metal screen and thinly precoated with inexpensive filter-aid powder which is easily applied and easily removed. Valuable additives remain unchanged. After passing through the screen, the clean filtered oil flows down a center tube into the outlet manifold. From this point, the clear filtered oil is recirculated to the machines.

Benefits And Advantages

After one year of operation with the Hoffman system, maximation was achieved with these unprecedented production and operation savings:

- Higher speeds, faster feeds, improved finishes, a better part at less cost.
- Fewer rejects – higher production rate.
- Longer tool life with clean oil free of chips and abrasive dirt particles.
- No loss of oil during chip removal.
- Greatly reduced down time. Cleaner floors. Oil waste reduced to a minimum.
- Maintenance of individual motor pumps completely eliminated.
- Actual records showed the yearly oil loss reduced to .1665 gallons per production hour or an approximate saving of 21.7%.

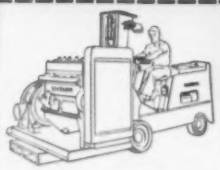
For more facts circle 542 on Reply Card

Maximation Pays For Itself

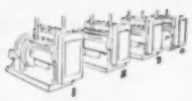
The Hoffman Central System has made it possible to effect actual economies which have enabled us to pay for the installation in a satisfactory period of time. Reduced maintenance, longer tool life, improved product finish and other benefits have saved us thousands of dollars in turning out a million parts a day. Filtration by Hoffman is the ideal way to maintain clean cutting oil.

Comparable maximation results have been obtained at the Utica Drop Forge Div. of the Kelsey-Hayes Co., the Air Reduction Co., Kearney & Trecker Corp., Taylor Instrument Co., etc. etc. To check on the applications of individual tool and complete central pressure filter systems for cutting oils, water base coolants, grinding oils, honing and lapping oils, petroleum solvents, industrial waters and other fluids in your plant, send for free Bulletin FB100 and case histories.

Write U. S. Hoffman Machinery Corp., Dept. PE-1, Industrial Filtration Division, Thompson Road Plant #1, Syracuse, New York.

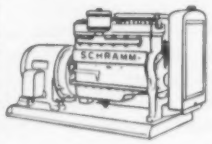


Easy to Move

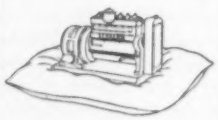


Unit System

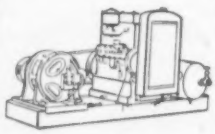
No Elaborate Foundations



Compact



No Vibration



Complete Package

EASY TO MOVE

Relocate Schramm Compressors double-quick for air where you need it

Eliminate long, expensive pipe lines. Take compressors right to the job. Relocate them—singly or in batteries—to meet production plans. Moving is fast and easy with Schramm Compressors. They're compact and easy to handle. They need no elaborate foundations; any floor space serves as a base. And every Schramm Compressor is a *complete package*.

Unit System—Use only as many compressors as you need now. Expand your installation as needs increase.

No Elaborate Foundation—Eliminate this added cost with a vibration-free Schramm installation.

Compact—Take up less space. Put your Schramm Compressor anywhere—take advantage of unused corners.

No Vibration—Schramm Compressors are vibration-free. They need no costly foundations—and they're easier on your buildings.

Complete Package—All you need for your air requirements in a single package . . . compressor, aftercooler, air receiver.

For complete information, write for Catalogs GC-57 and 5510, or see your nearest Schramm Dealer.

See the Yellow Pages for local Sales, Service and Rental of Schramm Air Compressors.

Schramm, Inc.

MANUFACTURERS OF AIR COMPRESSORS

665 North Garfield Ave. • West Chester, Pa.

For more facts circle 543 on Reply Card

OPERATION—PRODUCTION

(O and P begins on page 56)

any combination of switches tests the motor to determine the correct value of the necessary capacitor. This eliminates taking a large number of capacitors from the stock room to find out which one is needed.

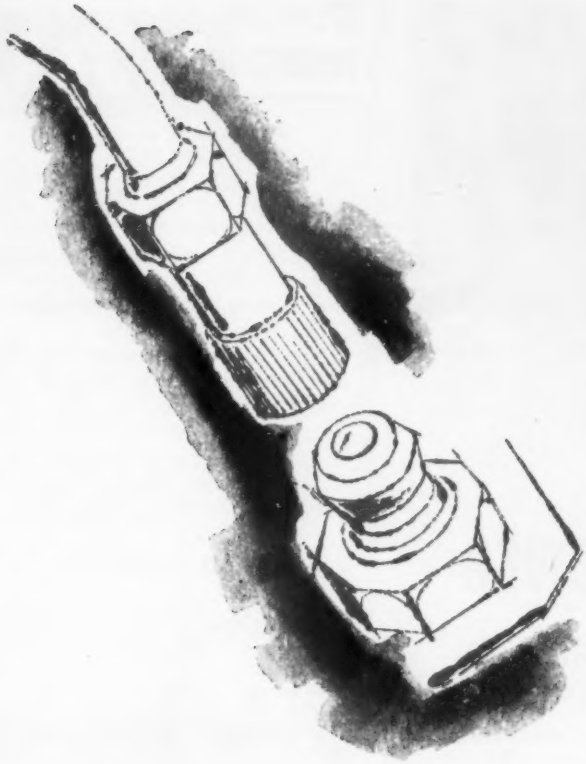
The substitution box is never connected to the power line. It only serves to arrange the paralleled capacitors so that they are temporarily connected to the motor under test.

Air Blast Speeds Metal Gouging

DESIGN CHANGES on cast iron lift truck counterweights at the Automatic Transportation Company, Chicago, Illinois, obsoleted 20 castings valued at $6000. Faced with the dilemma of scrapping these castings or modifying them to fit, it was determined that they could be used if a section of metal was removed from the radiator grill area.

Drilling and oxyacetylene cutting took three 8-hour shifts for each casting and resulted in expensive drill bit breakage. To reduce the cost of the operation, an Arcair torch manufactured by the Arcair Company, Lancaster, Ohio, was tried and completed the job in just

Inspecting area of lift truck counterweight casting where metal was melted with electric arc and molten metal blown out with compressed air.



Machinery... lubrication... and how to save money

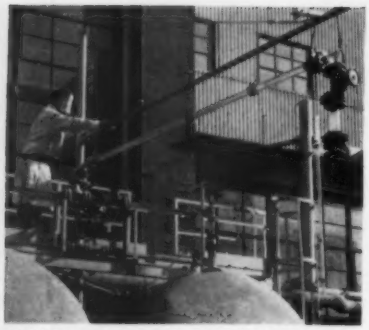
Sinclair Litholine® multi-purpose grease gives many important advantages over ordinary industrial lubricants. For example, it eliminates the need for a variety of single-use greases. Furthermore, it has earned a reputation for water resistance and high temperature performance. Change to Litholine, now. And when management asks how you've cut costs, tell them you've switched to Sinclair—and show them the results.

Find out how Litholine can help you. Call your nearest Sinclair Representative or write for free literature—Sinclair Refining Company, Technical Service Division, 600 Fifth Ave., New York 20, N.Y. There's no obligation.

Sinclair
Litholine
Multi-Purpose Grease

For more facts circle 544 on Reply Card

At Trubek Laboratories, Inc., East Rutherford, N. J., 1500 feet of PYREX pipe is used in this reaction system.



Outside storage and unloading station has 200 feet of 2-inch PYREX pipe as well as glass swivel booms.

Inside and out... at Trubek Labs they

TAME TOUGH CORROSIVES

with PYREX® glass pipe

INSIDE Trubek Laboratories, Inc., you'll find a four-component continuous reaction system for handling chlorine, HCl, and a number of corrosive organics.

Part of this system is piping—1000 feet of 1-inch and 200 feet of 2-inch PYREX brand *glass* pipe. Also included are PYREX brand glass Y-valves and Shell and Tube Heat Exchangers.

OUTSIDE at Trubek, you'll see an acid chloride storage system and tank truck unloading station. Here you'll find an additional 200 feet of 2-inch PYREX pipe, as well as special swivel booms made from glass.

Why does Trubek pick *glass* pipe for taming tough corrosives? Because this pipe is made from PYREX brand glass No. 7740. This is the glass that is resistant to more acids and acidic materials than any other pipe. It's the same glass in which laboratory tests for the chemical durability of other corrosion-resistant materials are generally carried out. And you are assured of product purity because PYREX pipe does not contaminate even the most sensitive product.

And, you can *see* what's going on in every inch of PYREX pipe. Should blockage occur—a rare happening because glass is so *smooth* — you can quickly spot it, without costly downtime and dismantling.

Is glass pipe fragile? Not PYREX pipe because it's made to stand up to high temperatures, pressure, and considerable mechanical shock.

How about costs? If you consider that installing glass often requires less time than other materials, you can start with at least one saving. But the *big* economy comes from the fact that glass *lasts*. Example: One firm reports that, after 9 continuous years of piping chlorine through 1600 feet of PYREX pipe, they had no corrosion at all. And maintenance had cost only $6.32 per year.

Why not put all the facts and figures about pipe for handling corrosives at your finger tips. Send for Bulletin PE-3, "PYREX brand 'Double-Tough' Glass Pipe and Fittings." Use the coupon for quick action on your request.

CORNING MEANS RESEARCH IN GLASS

CORNING GLASS WORKS

10 Crystal Street **Corning, New York**

Please send me: ☐ PE-3, the manual on PYREX brand glass pipe.
☐ PE-4 on the all-glass Y-valve.

Name.....Title.....

Company.....Address.....

City.....Zone.....State.....

For more facts circle 545 on Reply Card

OPERATION—PRODUCTION

(O and P begins on page 56)

six hours per casting. The power source was set at 475 amp d-c straight polarity and compressed air at 90 psi was fed to the torch from the shop air supply. Gouging each casting consumed 100 ¼-in. electrodes costing $11.92.

The Arcair process works by combining an electric arc with ordinary compressed air. The arc melts the metal in the contact area and a jet of air paralleling the electrode then blasts the molten metal out of the electrode path.

Set Slip Clutch This Easy Way

Slip clutch tension on overhead conveyor systems is readily set to manufacturers recommendations by using a Dillon dynamometer in place of one or two links of chain on the conveyor. Pounds tension on the chain is read directly from the dynamometer dial and the slip clutch adjusted accordingly. Available in 13 capacities from 500 to 100,000 pounds, the dynamometers are manufactured by W. C. Dillon & Company, Inc., Van Nuys, California.

Titanium Tubing Cools Caustic

TITANIUM welded tubing used in a cold water heat exchanger for cooling a caustic soda, sodium hypochlorite solution during chlorination is saving over $1500 in yearly operating costs at the Kuehne Chemical Company, Elizabeth, N. J.

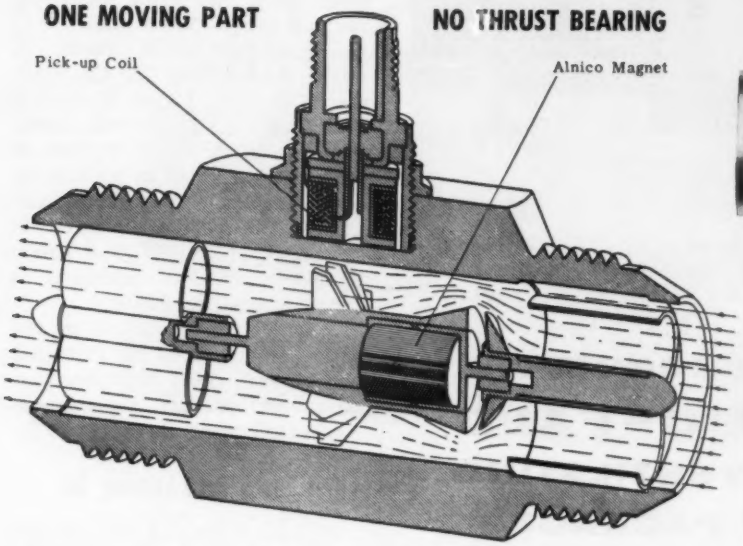
Tubing previously used had a yearly replacement bill well over $300. This was only a small portion of the cost, as tubing replacement required a four to five hour shutdown two or three times a month. In addition, the hypochlorite was

FACTS ABOUT pottermeter BOWSER INDUSTRIAL METERS

TURBINE-TYPE AND POSITIVE-DISPLACEMENT HIGHEST ACCURACY METERS FOR CHEMICAL, PETROLEUM, INDUSTRIAL, LIQUID FOOD AND PHARMACEUTICAL APPLICATIONS

POTTERMETER . . . electronic-sensing turbine type

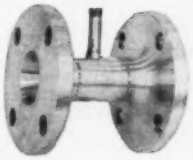
ONE MOVING PART **NO THRUST BEARING**



Pottermeter produces an electric signal whose frequency is accurately proportional to the rate of flow of a liquid through a pipe section. Suitable instrumentation measures this signal to indicate or record the flow, or operate any controls required in a liquid handling operation.

SANITARY FOOD AND BEVERAGE (fast take down)

Quick-coupling stainless steel Pottermeters can be backwashed or easily and completely disassembled for cleaning.



INPLANT OR OUTDOORS

PIPELINE MOUNTING

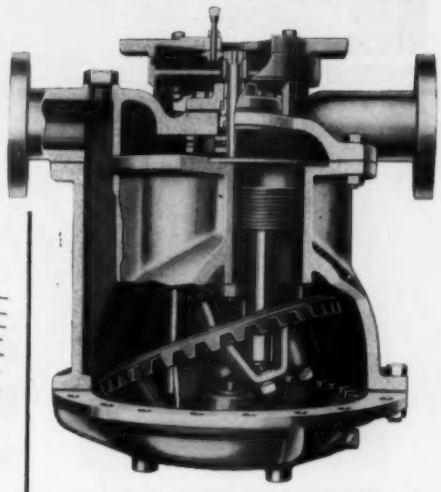
EASY TO INSTALL

Inlet and outlet connections are unlimited as to type and size.

AVAILABILITIES

FLOW RANGES	to 40,000 g.p.m. or more
OPERATING PRESSURES	unlimited
TEMPERATURE RANGES	−455°F. to +1500°F.
PRESSURE DROP	virtually nil
CONNECTIONS	no limitation
CONSTRUCTION (standard)	Type 316 stainless steel

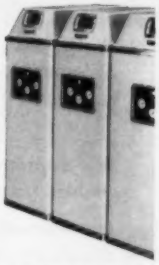
BOWSER XACTO positive piston displacement



Xacto Meters utilizes positive displacement pistons linked with a drive shaft to mechanically operate any one of many types of counters, or to transmit pulses for recording devices or for remote control of the metered liquid.

PROPORTIONING BLENDERS

Xacto Meter equipped. Blend two or more liquids in closed system, continuous production. Also rate of flow controllers to maintain constant control of flow rate automatically.



AVAILABILITIES

FLOW RANGES	6 g.p.h. to 250 g.p.m.
OPERATING PRESSURES	to 500 p.s.i.
TEMP. RANGES	−40°F. to +225°F.
PRESSURE DROP	moderate
CONNECTIONS	to catalog standards

SALES AND SERVICE OFFICES IN PRINCIPAL CITIES

•

WORLD'S MOST COMPLETE METER LINE

INDICATING, RECORDING AND CONTROL AVAILABILITIES

INDICATING devices permit reading at meter or remote locations.

•

RECORDING devices provide file data for permanent records.

•

CONTROL devices enable liquid process automation for batching, blending, packaging, etc.

Both Xacto Meters and Pottermeters provide the basis for improved liquid control systems. New readout devices, both mechanical and electronic, adapt to these meters. A Pottermeter-Bowser sales engineer will gladly confer on your metering requirements at your request.

WRITE FOR CATALOG DATA FOLDERS

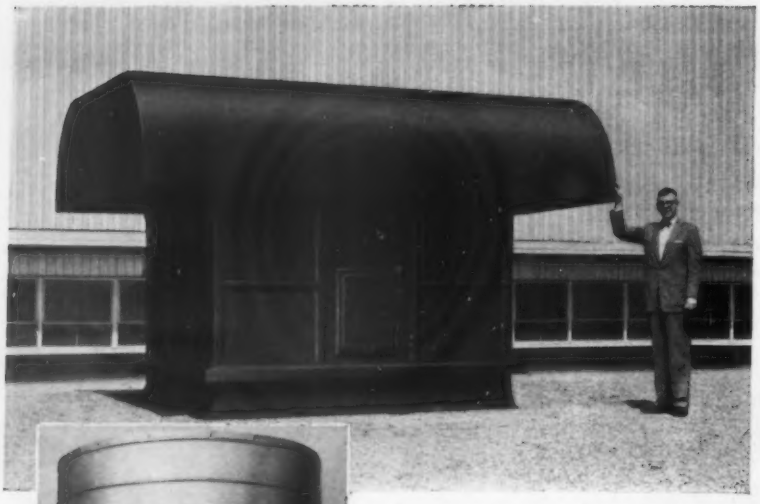
•

SPECIFY LIQUID TO BE METERED

POTTER-BOWSER DIVISION...BOWSER, INC.

MARKETING DIVISION FORT WAYNE, INDIANA

For more facts circle 546 on Reply Card



"Buffalo" Style "H" Sky-Vent Power Roof Ventilator.

"Buffalo" Style "V" Sky-Vent Power Roof Ventilator.

ECONOMICAL "BUFFALO" VENTILATING PACKAGES

Your Maintenance Staff Can Easily Install!

Do you need high volume exhaust ventilation for plant areas where duct work would be unduly expensive — or for locations without adjacent outside walls? Ventilation that will not consume valuable production space, or interfere with future plant modifications? Then "Buffalo" Sky-Vent Power Roof Ventilators are your *practical* answer — for these reasons:

- **Economical to Install** — "Buffalo" Sky-Vents are shipped as completely assembled packages, including fan, motor, housing, hood and roof curbing.
- **Economical to Operate** — The high efficiencies of "Buffalo" fans result in the lowest possible operating costs.
- **Economical to Maintain** — Maintenance expense is held to an absolute minimum by "Buffalo's" rugged, rigid, weather-proof construction and ⅛" thick cork impregnated asphalt coating on interior and exterior surfaces.

Dependable, economical, trouble-free "Buffalo" Styles "H" and "V" Sky-Vent Power Roof Ventilators are available with famous "Buffalo" Propeller or Axial Flow Fans in 12" through 120" wheel diameters, to exhaust 1000 to 250,000 CFM of hot air, fumes and fogs. For complete application information, contact your nearby "Buffalo" engineering representative—or write for Bulletin FM-2345.

"Buffalo"

BUFFALO FORGE COMPANY
166 Mortimer St. • Buffalo, N. Y.

Buffalo Pumps Division, Buffalo, N. Y.
Canadian Blower & Forge Co., Ltd., Kitchener, Ont.
Sales Representatives in all Principal Cities

INDUSTRIAL EXHAUSTERS • BELTED VENT SETS • PROPELLER FANS • "E" BLOWERS-EXHAUSTERS

For more facts circle 547 on Reply Card

OPERATION—PRODUCTION

(O and P begins on page 56)

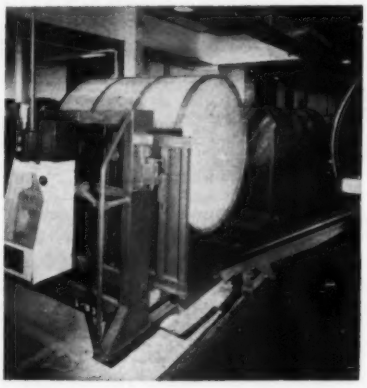
contaminated by the cooling water, requiring extra processing to remove the contaminant. In all, tubing cost, maintenance labor, time lost from other work and extra processing ran well over $1500 a year.

Seventy-eight 10-ft lengths of tubing, furnished by The Carpenter Steel Company, Union, N. J., are positioned vertically in each caustic soda processing vat. Both ends of the tubing are held in position by plastic end plates and rubber gaskets. An externally threaded nut squeezes the special rubber gasket against a shoulder, extruding it tightly around the tubing.

With no tubing failure in two years of use, output has increased, maintenance costs have been reduced and product contamination has been eliminated.

Lifter Eases Oven Loading Job

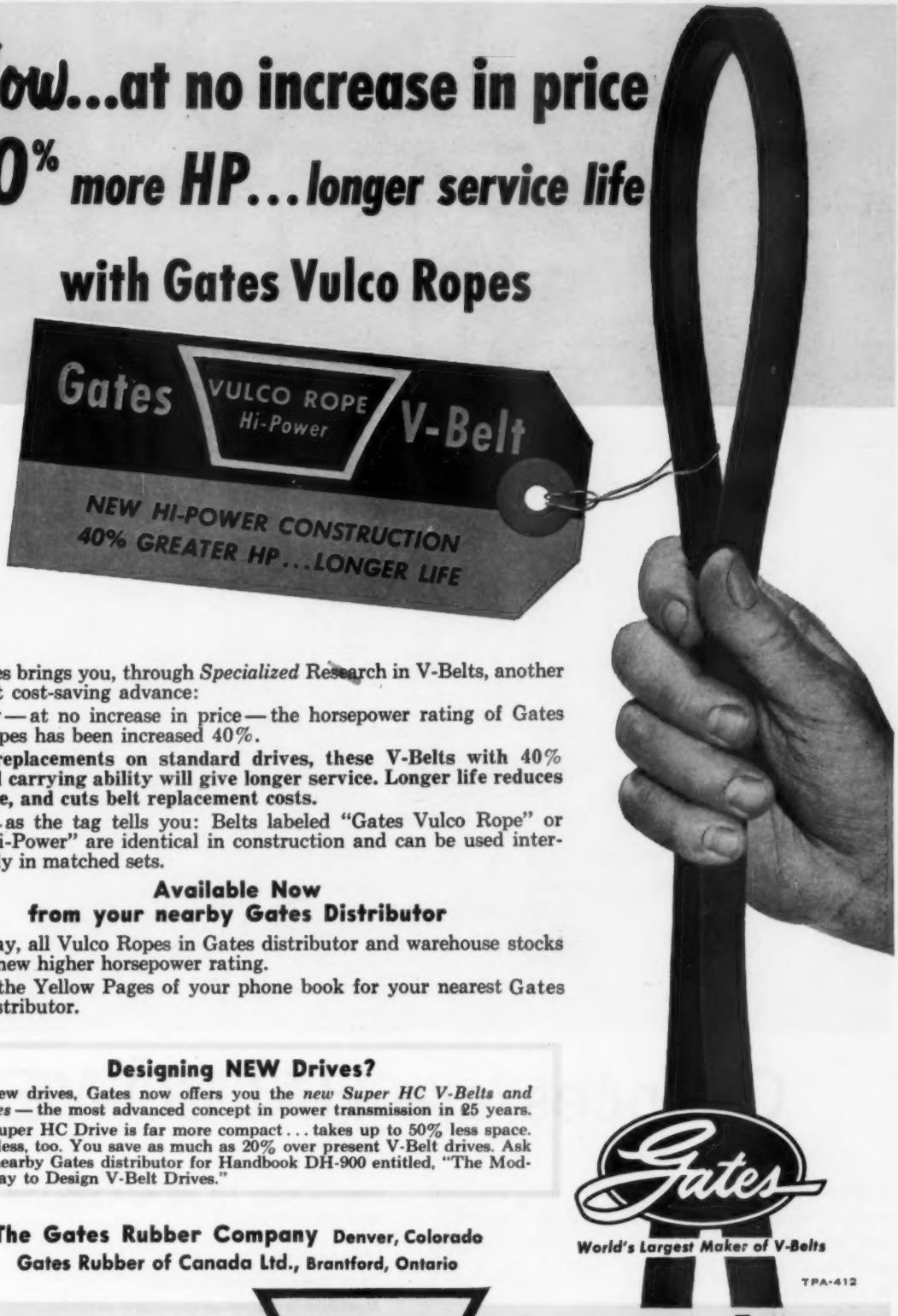
INSTALLATION of a recessed lifter has solved a materials handling problem at the Brown & Williamson Tobacco Corporation, Louisville, Ky. The lifter has eliminated manual pushing of large drums of tobacco up ramps into curing ovens. Designed by the Special Products Division of the Colson Corporation, the lifter is operated by a ½-hp motor.



Lifter raises large tobacco drums to oven door level to reduce loading time.

As the platform is elevated, a retracted bridgeplate drops to bridge the gap between the lifter platform and the curing oven.

Now...at no increase in price
40% more HP...longer service life
with Gates Vulco Ropes



Gates brings you, through *Specialized* Research in V-Belts, another important cost-saving advance:

Now—at no increase in price—the horsepower rating of Gates Vulco Ropes has been increased 40%.

As replacements on standard drives, these V-Belts with 40% more load carrying ability will give longer service. Longer life reduces down-time, and cuts belt replacement costs.

And as the tag tells you: Belts labeled "Gates Vulco Rope" or "Gates Hi-Power" are identical in construction and can be used interchangeably in matched sets.

Available Now
from your nearby Gates Distributor

Today, all Vulco Ropes in Gates distributor and warehouse stocks have the new higher horsepower rating.

See the Yellow Pages of your phone book for your nearest Gates V-Belt distributor.

Designing NEW Drives?

For new drives, Gates now offers you the *new Super HC V-Belts and Sheaves*—the most advanced concept in power transmission in 25 years. The Super HC Drive is far more compact... takes up to 50% less space. Costs less, too. You save as much as 20% over present V-Belt drives. Ask your nearby Gates distributor for Handbook DH-900 entitled, "The Modern Way to Design V-Belt Drives."

The Gates Rubber Company Denver, Colorado
Gates Rubber of Canada Ltd., Brantford, Ontario

Gates
World's Largest Maker of V-Belts

TPA-412

Gates VULCO ROPE Hi-Power V-Belts

For more facts circle 548 on Reply Card

Chances are HALLOWELL

You have the best chance of getting exactly what you want, in shop equipment as in anything else, where you have the most to choose from. That's the first advantage of the unmatched variety you'll find in Hallowell.

Give yourself a cost advantage, as well. Chances are your distributor stocks the standard units and accessories you'll need. That saves having to buy them at built-to-order prices. You pay only for *standard* units, but get much more than standard unit usefulness.

Choose from:
Open, unit or cabinet benches
New Erectomatic® or standard shelving
Cabinets, tool stands, laboratory units
Shop desks, stools, chairs.

Your Hallowell distributor can show you different

has just what you want

leg heights, a choice of bench tops, the most functional arrangement of storage units, tool stands and accessories.

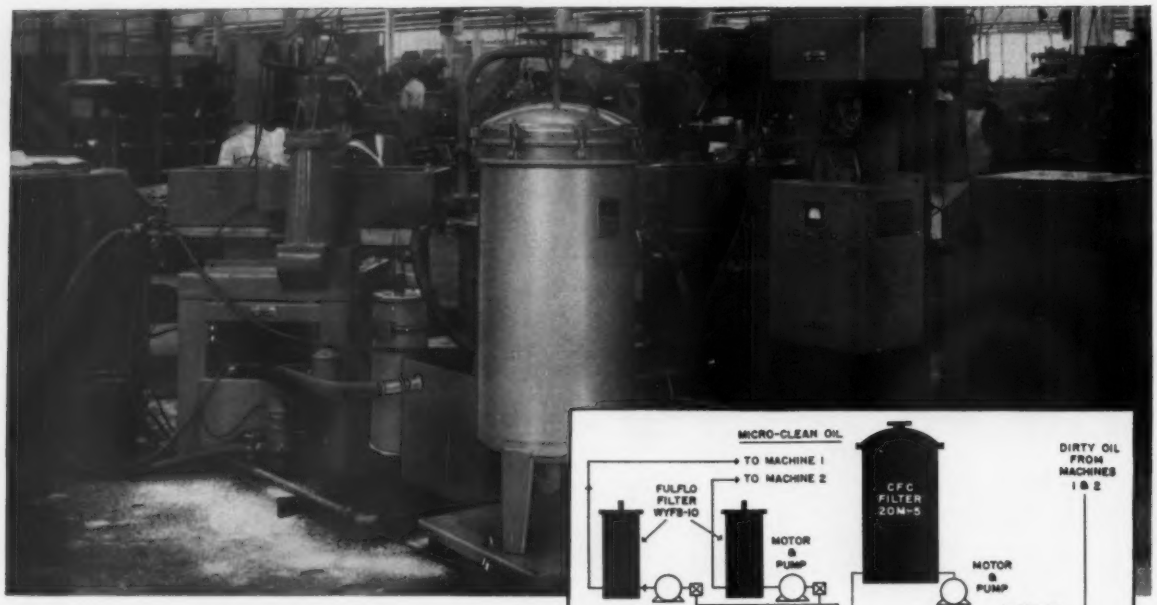
All are built to the well-known Hallowell standards. They are durable, and adaptable to future needs . . . built to last without becoming obsolete. Before you order *any* shop equipment, check the Hallowell line. You'll get what you want *first*, where you can choose from the most.

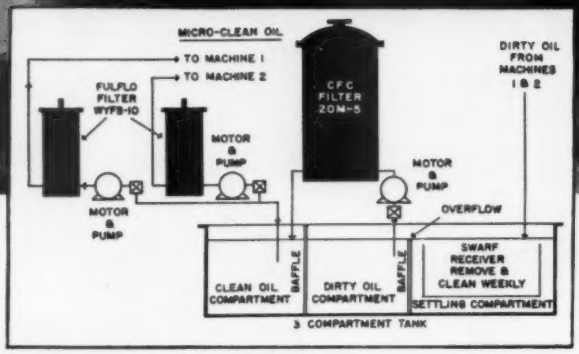
See your authorized Hallowell Distributor or write direct

COLUMBIA-HALLOWELL Division **SPS**

JENKINTOWN 26, PENNSYLVANIA • SPS WESTERN, SANTA ANA, CAL.

For more facts circle 549 on Reply Card





Elox metal disintegrating machines in use at Wales-Strippit Company must have clean, sediment-free, dielectric cutting oil. Oil is pumped through CFC Honan-Crane Filter, equipped with Cranite (fuller's earth) cartridges, to remove colloidal contaminants that can not be removed with inert-type filters. It is then pumped on a full-flow basis through Fulflo Filters to the Elox Machines. This filter combination maintains the oil essentially free of all contaminants. Clean oil allows the Elox Machines to operate at their maximum efficiency.

WALES-STRIPPIT gains 2 production hours per day—per machine—with *Fulflo* and *CFC* Filters

Here's how Wales-Strippit Company solved the problem of costly downtime — and also assured superior quality of holes cut with Elox Disintegrating machines. First, they switched to CFC Honan-Crane Multi-Cartridge Filters with Cranite (fuller's earth) elements. This removes both solid and dissolved impurities to assure micro-clarity. Oil is then fed to the electrode area through Fulflo Filters, with Honeycomb Filter Tubes, to remove any micro-contaminants that may have entered the system after the initial filtration.

Result? Downtime to change filter elements for each machine was reduced from 20 minutes every 3 to 4 hours — to 20 minutes once each week. This saving in downtime permits an extra 2 hours of productive time per machine, per day (for three 8-hour shifts). In addition, micro-clarity of the oil prevents any nicks in the cut surface and enables the machines to hold close tolerances between the electrodes and work areas.

Fulflo Filters provide true depth filtration to any degree of micro-clarity for all types of industrial fluids — oils, liquid fuels, liquid chemicals, compressed air, CO_2 and other gases; for high or low flow rate, pressure, *p*H, temperature, or viscosity. CFC Honan-Crane Filters are designed for bypass application, coolant clarification, magnetic separation, and many other uses.

Send for technical literature or engineering assistance to Department PG

COMMERCIAL FILTERS CORPORATION
MELROSE 76, MASSACHUSETTS
PLANTS IN MELROSE, MASSACHUSETTS AND LEBANON, INDIANA

MICRO-CLARITY AT MINIMUM COST

Fulflo Filters — *with genuine Honeycomb Filter Tubes for controlled micro-clarity of industrial fluids.*

CFC Filters — *Selective filtration of oils • water-oil separators • magnetic separators • pre-coat filters • coolant clarifiers • automatic tubular conveyors.*

For more facts circle 550 on Reply Card

Tuffy Tips —on safe use of Slings and Hoist Lines

Safety Council Cites Factors In Lifting Injuries

The National Safety Council points out that nearly a fourth of all compensation cases are the result of unsafe handling methods or conditions, and lists the following as factors contributing to handling injuries:

"(a) Handling loads that are too heavy; (b) lifting or lowering with the back muscles instead of the leg muscles; (c) handling load with an insecure grip and failing to watch where hands are placed; (d) handling without sufficient help or failing to use mechanical equipment; (e) handling before getting a firm footing; (f) lifting or lowering with a jerking, twisting movement of the body, or when the body is in an awkward position."

Maintenance Tips for Hoisting Equipment

(1) Be sure crane and hoist controls are in proper working order. Don't use equipment that hasn't been tested recently.

(2) Inspect hitching equipment before it is used. Recheck after use.

(3) Remove hitching equipment not in use from hooks, hoists and loads. Don't allow it to remain loose.

(4) Store slings systematically when they're not in use. Don't let them lie around helter-skelter. They may be damaged between lifts.

Proper Sling Fittings Assure Greatest Safety and Efficiency

Fittings used on Tuffy Slings are of the most improved types and are factory-fitted on the Tuffy Sling you order. Or, if you prefer, you can fit them in your rigging loft. Shown here are two of these Tuffy Sling fittings.

Newco Gripper Sling Hook:

Fitted with a spring that bears against the sling. This holds slide hook at any position on sling, thus preventing it from sliding down to the sling eye each time it is unhitched. Easily positioned for each new load. Hook readily chokes into position when load is applied.

Sliding Hook

The smoothly rounded saddle slides on the sling leg with minimum wear to tighten on the load. Made of extraordinarily tough manganese steel to afford an ample factor of safety on rated loads. Designed with steel distributed in relation to stress lines.

Tuffy Hoist Line: Perfect Team Mate for Tuffy Slings

Tuffy Hoist Line is a special rope construction for use on all types of overhead cranes, derricks and clamshells. It has the right combination of strength, flexibility and toughness for greatest safety and longest life in its wide range of uses.

See Your Tuffy Distributor for the Most in Sling and Wire Rope Service

Ferrule Safety is a Part of Sling Safety

The steel ferrule is applied under tremendous pressure. It holds so tight that the eye splice has 100% of fabric strength. It's smoothly tapered to meet the main body of the sling. No abrupt edges or sharp projections. The extra quality and safety of Tuffy's pressed-on ferrule is yours at no extra cost.

Tuffy Braided Wire Fabric: Successor to Wire Rope in Slings

The secret of the extra strength and greater flexibility of Tuffy Slings is also the secret of their greater safety. It's the exclusive, patented, machine-braided fabric. You won't find it in any other sling. It means longer sling life, easier handling and greater ability to take deadloads, shocks and impact with safety.

Kinks Can't Hurt a Tuffy Sling

One of the first rules of ordinary wire rope safety: never use a sling that has been kinked. The wires are permanently bent, damaged and weakened. Not so with Tuffy Slings. Tuffy's patented, 9-part machine-braided fabric is just about impossible to kink. And if it does, under some unusual condition, you can straighten out the kink with ease—leaving no material damage.

FREE! New Tuffy Sling Handbook

Revised and enlarged edition. Covers slings from A to Z. Gives types, dimensions, weights, rated loads, proper fittings. Even includes safety-approved standard signals used in operation of various equipment. Send for your free copy now. Address **Union Wire Rope Corporation, 2272 Manchester Ave., Kansas City 26, Mo.** Specialists in high-carbon wire, wire rope, braided wire fabric and stress relieved wire and strand.

UNION Wire Rope

S-3

Subsidiary of ARMCO STEEL CORPORATION

OTHER SUBSIDIARIES AND DIVISIONS: Armco Division • Sheffield Division • The National Supply Company
Armco Drainage & Metal Products, Inc. • The Armco International Corporation • Southwest Steel Products

New steels are born at Armco

For more facts circle 551 on Reply Card

For more facts circle 552 on Reply Card →

PENETRATES RUST TO BARE METAL

The specially-processed fish oil vehicle in the Rust-Oleum 769 Damp-Proof Red Primer penetrates rust to bare metal – as proved in radioactive tracing studies.

ON RUSTED SURFACES simply apply Rust-Oleum 769 Damp-Proof Red Primer directly over the sound rusted surface after scraping and wirebrushing to remove rust scale and loose rust. You stop present rust, because the *specially-processed* fish oil vehicle in the primer penetrates through the rust to bare metal – driving out air and moisture that cause rust. You save time and money – as costly surface preparations are usually eliminated. It's easier to use, too . . . because the "grease-like" nature of the fish oil vehicle in the primer enables it to slide over the surface and work its way through the rust formations – yet, it dries to a firm, protective, decorative coating that provides a tough, durable base for Rust-Oleum finish colors.

RUST-OLEUM®

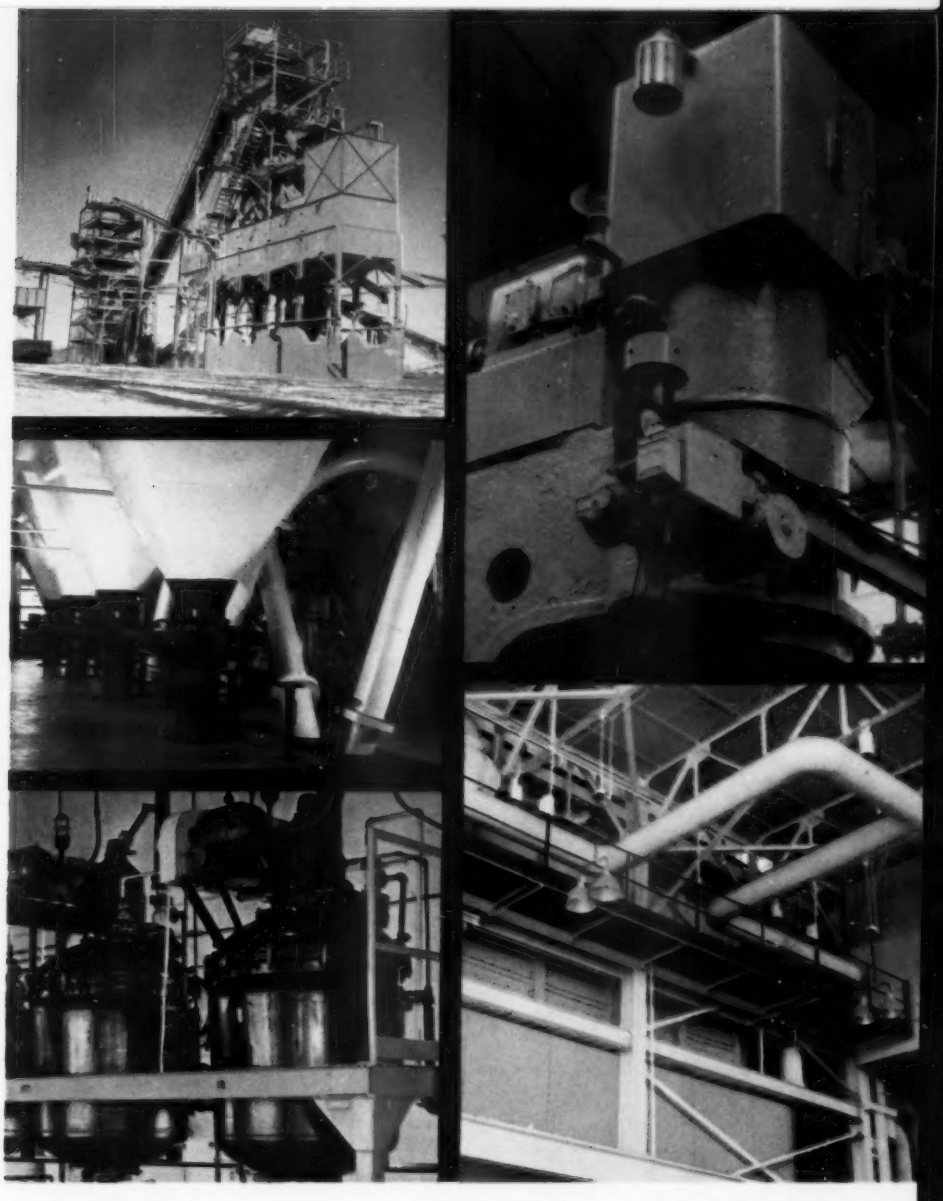
STOPS RUST!®

SEE OUR CATALOG IN SWEET'S

WRITE FOR COPY

What the Rust-Oleum SYSTEM of lasting beauty does for you!

A matter of excellence.
Distinctive as your own fingerprint.



BRUSH OR SPRAY the Rust-Oleum finish color of your choice over 769 Damp-Proof Red Primer – that's the Rust-Oleum system of colorful, lasting beauty for rusted metal. Previously painted surfaces in good condition normally require only one Rust-Oleum coat. Rust-Oleum top coatings are available in practically ALL COLORS. Many of them are specially formulated to resist heat, chemicals, and other corrosion-producing conditions, while others are formulated to match the original colors on construction, farm, and oil field machinery and equipment. Try Rust-Oleum soon. Prompt delivery, efficient service, and a wealth of rust-stopping experience are yours through your nearby Rust-Oleum Industrial Distributor.

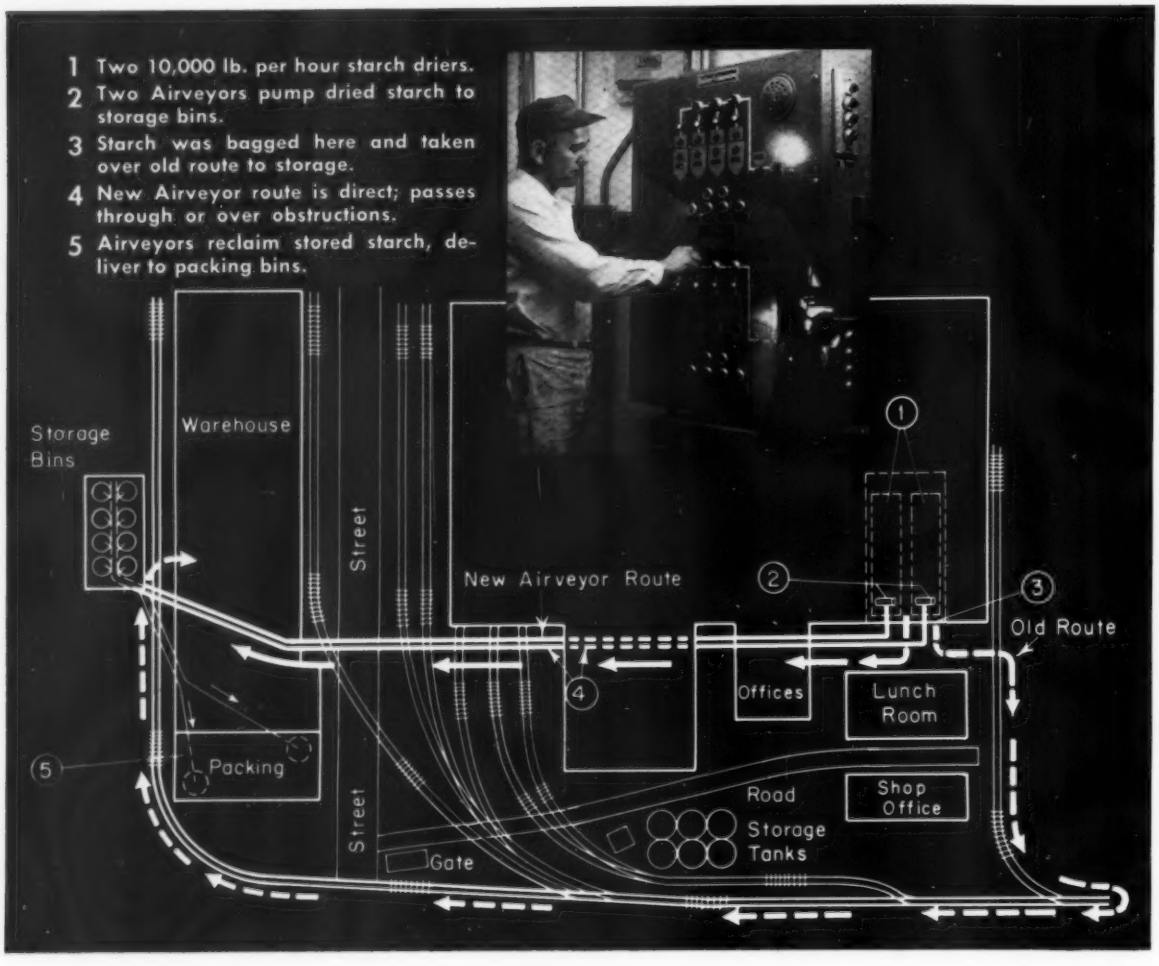
Available in all colors!

SEND FOR FREE TEST SAMPLE! ATTACH TO YOUR LETTERHEAD!

Rust-Oleum Corporation
2983 Oakton Street, Evanston, Illinois

Please send me the following at no cost or obligation:

- ☐ Free test sample of Rust-Oleum 769 Damp-Proof Red Primer for rusted metal surfaces.
- ☐ Complete literature with applications and color charts.
- ☐ Information on matching special colors.
- ☐ Thirty-page report on Rust-Oleum fish oil penetration.



PLANT MODERNIZATION THROUGH PNEUMATIC CONVEYING

FULLER pneumatic conveying system increases production without plant expansion

To increase production, the Union Starch and Refining Company's Granite City, Ill., plant first needed to expand their materials handling system. But a complete revamping of bagging and warehouse operations was impossible because there was no space available for necessary new buildings.

An Airveyor® System, engineered and built by Fuller, was the answer. Airveyor's extreme flexibility allowed it to be set up through walls, along sides of buildings, over streets, on roofs and up inclines. At Union Starch, the total distance covered is 800 feet, with a number of 45 degree and 90 degree bends in the line.

The Fuller Airveyor system transports the starch in two phases, from the driers to the storage bins and from the bins to receiving hoppers over the bagging machines. Flow is controlled automatically through control panels located in the drier room and at the bagging machines. Other controls are also provided at the panels for automatic operation of components such as feeders, blowers, conveyors and filter-receivers.

Besides being easily installed and automatically controlled, the Fuller system reduces both the amount and the expense of handling. Additional savings are made possible by Airveyor's self-cleaning facility, which greatly reduces maintenance costs.

Why not work with Fuller to design an automated pneumatic materials handling system that will help you cut costs and increase production? Write today for complete details. A-280 1355

FULLER COMPANY
GENERAL AMERICAN TRADE MARK

FULLER COMPANY
138 Bridge St., Catasauqua, Pa.
SUBSIDIARY OF GENERAL AMERICAN TRANSPORTATION CORPORATION
Birmingham • Chicago • Kansas City • Los Angeles • New York • San Francisco • Seattle

Fuller
....pioneers in harnessing AIR

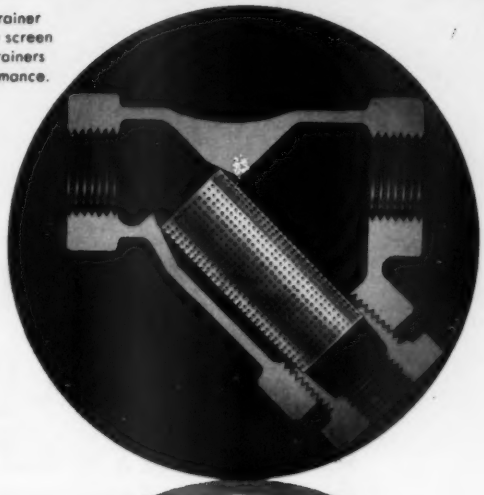
For more facts circle 553 on Reply Card

protect your equipment against scale and dirt

Exterior view of NEW Sarco Type "AT" Pipe Line Strainer. Note 45° blow-down angle to facilitate piping away from strainer.

with this

NEW SARCO TYPE "AT" PIPE LINE STRAINER



Cutaway of NEW Sarco Type "AT" Strainer shows sediment collection chamber below screen. Standard screen used in Sarco "AT" Strainers is key to their uniformly successful performance.

Examine one of the new Sarco Type "AT" Strainers and you'll notice at once that its design is a marked improvement over that of contemporary strainers . . . in three important ways:

The Sarco screen, key element of the unit, fits tightly into a long, tapered screen seat. This feature absolutely stops the by-passing of particles around the screen. Secondly, the rigid, welded construction of heavy-gauge brass makes sure the fit will remain tight, even when trapped sediment builds up pressure.

Third, you'll see that the new AT is easy to clean. No sharp edges or weave crevices in the screen for particles to cling to. Blow-down cleaning is simplified by the 45° angle construction.

Write for Sarco Bulletin No. 1210B which gives dimensions, capacities, and technical data. 7317-B

NOTE THIS ADDED PROTECTION AND CONVENIENCE

1. Bodies of heavy-duty 250 psi semi-steel. Tensile strength to 30,000 # per square inch minimum.
2. For maximum strength, bodies are reinforced with external rib.
3. Long, tapered screen seat assures correct screen position and tight fit without buckling.
4. Cap design provides a sediment collection chamber below screen.
5. Generous proportion of open screen area in relation to pipe size minimizes pressure drop.

SARCO
COMPANY, INC.
635 Madison Avenue, New York 22, N. Y.

STRAINERS • STEAM TRAPS • TEMPERATURE CONTROLLERS • HEATING SPECIALTIES

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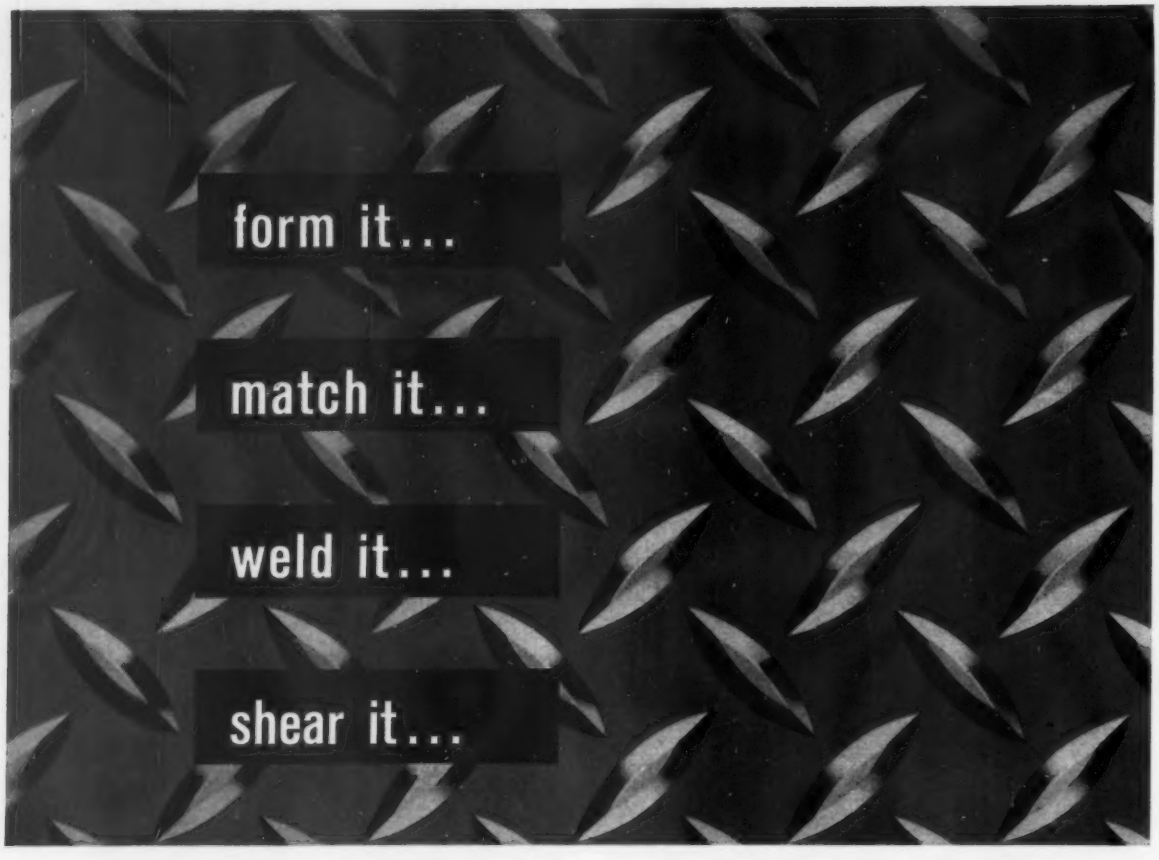


Alan Wood Super Diamond floor plate ...is easy to fabricate

Wherever necessary, A. W. Super Diamond rolled steel floor plate can be sheared, formed, welded, and easily matched. The arrangement of the unique pattern allows you to bend it at any place.

This is a heavy duty floor plate that will last for years . . . and provide a safe, non-skid footing. No chipping, splintering or cracking . . . *and* no skidding. You save on cleaning costs, too . . . because A. W. Super Diamond is easily swept or mopped *from any direction*. It drains freely . . . no pockets to hold dirt.

For easy fabrication and installation . . . for safety . . . for long wear . . . specify A. W. Super Diamond. Write for Bulletin SD-N3

ALAN WOOD STEEL COMPANY

CONSHOHOCKEN, PA.

DISTRICT OFFICES: Philadelphia • New York • Los Angeles • REPRESENTATIVES: Atlanta • Boston • Buffalo Cincinnati • Cleveland • Detroit • Houston • Pittsburgh • Richmond • St. Paul • San Francisco • Seattle Montreal, Toronto and Vancouver, Canada—A. C. Leslie & Co., Ltd.

For more facts circle 555 on Reply Card

Change hats
with your maintenance man . . .

You'll find out . . .

Vertical Lift Metal-clad is safer; you can see when it's disconnected

Peace of mind means a lot when your work involves contact with thousands of volts of electricity. Ask your maintenance man which make of metal-clad gives him peace of mind, and he'll tell you G-E Vertical Lift. He can see when the primary disconnects are parted—no need to guess whether or not the breaker is safely open. And, all live parts are automatically shielded as the breaker disconnects.

Before you buy your next switchgear line-up, consider your maintenance man and the see-able peace of mind only Vertical Lift Metal-clad can give him. General Electric Company, Schenectady 5, New York. 511-32

Progress Is Our Most Important Product

GENERAL ELECTRIC

For more facts circle 556 on Reply Card

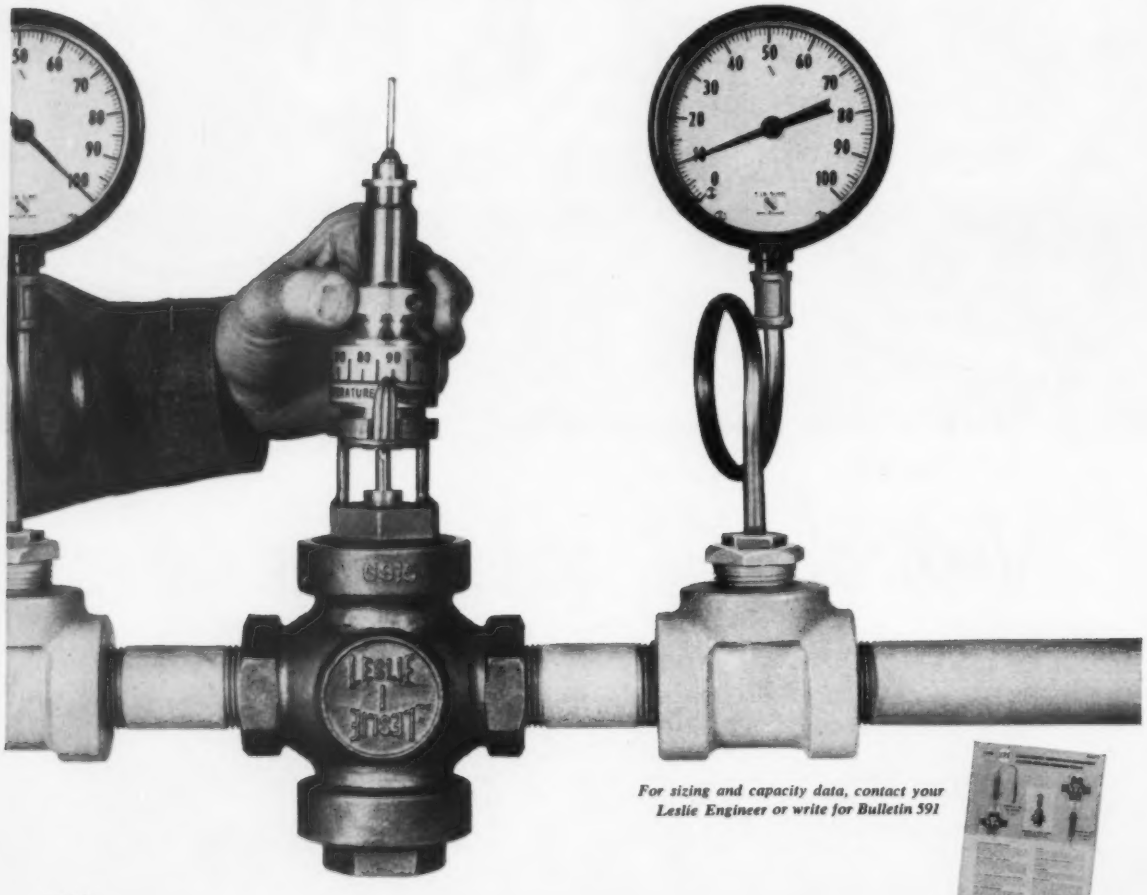
accuracy, reliability
ENGINEERED INTO LESLIE'S COMPLETE

NEW SINGLE-SEATED, BALANCED DISC, TEMPERATURE REGULATOR HANDLES INLET PRESSURES TO 100 psi.

New Leslie regulator can handle inlet pressure and pressure drops to 100 psi. High power, positive movement of an actuating bellows with solid liquid fill, and the virtually friction-less stuffing box provides stem movement exactly proportional to the temperature change at the bulb.

Designed for steam or water service, it features a single seated, self-aligning, tight closing inner valve. (Units can be changed in the field from direct to reverse acting, or from reverse to direct acting, simply by inverting body and main valve.)

Applications include instantaneous heaters or coolers—shell and tube or shell and coil heat exchangers; storage or tank heaters; and, process heaters or coolers of all types. Available in cast iron or cast bronze bodies for temperatures to 450°F. Sizes ¾ and 1″, screwed connections.

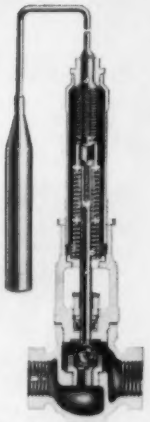


For sizing and capacity data, contact your Leslie Engineer or write for Bulletin 591

LC-10

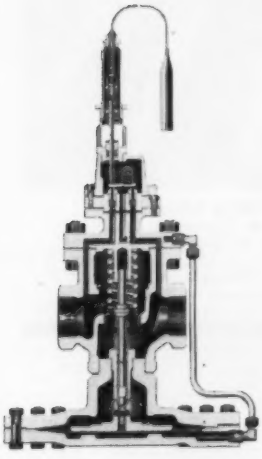
LINE OF TEMPERATURE REGULATORS.

OTHER VERSATILE LESLIE REGULATORS PROVIDE PRECISE TEMPERATURE AND PRESSURE CONTROL.



Bellows Operated Temperature Regulator For Small Flows

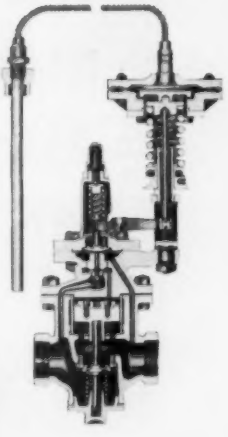
Direct Operated Design is used for small flow heating and cooling service, size ⅜, ½ and ¾". Liquid filled thermostatic element supplies ample power to stroke the single seated main valve. Valve travel is directly proportional to temperature change at bulb. This design is suitable for instantaneous and storage type heaters. It is also available in double seated construction for cooling service.



Class TKM Pilot Actuated, Metal Diaphragm Operated Temperature Regulator

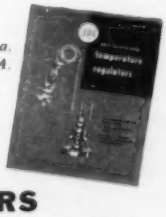
Pilot Operated, Single Element Control also uses the liquid filled element to operate pilot device which applies operating pressure from the regulator inlet to a diaphragm for stroking main valve in heating or cooling service. Large diaphragm area and operating pressure supply ample power for controlling long stroke, single seated main valve with full flow capacity in sizes ½-4". Regulator has a 3 to 5° throttling range and is suitable for all storage type heat exchangers and for any system requiring on-off control.

Class LTCO Pilot Actuated, Piston Operated Temperature Regulator



Pilot Operated, Duo-Matic (two-element control) design offers both temperature and pressure regulating functions in a pilot actuated, piston or diaphragm operated regulator. The valves can handle a range of inlet steam pressures in heating services from 25 to 600 psi and controlled pressure ranges of either 2 to 15 psi or 10 to 250 psi. These characteristics are ideal for all storage type heaters and most instantaneous heater problems. Available in sizes ¼-6" with iron, bronze and cast steel construction.

For complete sizing and capacity data, write for Bulletin 5307-A.



TRADE LESLIE MARK

REGULATORS and CONTROLLERS

Leslie Co., 131 Leslie Building, Lyndhurst, New Jersey

Over 275 Factory-Trained Engineers At Your Service—Nationwide!

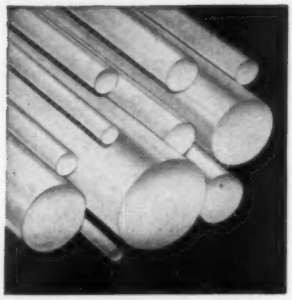
For more facts circle 557 on Reply Card

Cadillac Announcement

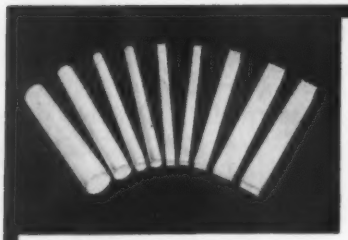
We now manufacture standard Teflon shapes!

CADILLAC PLASTIC and CHEMICAL COMPANY

COMPLETE STOCKS IN 11 WAREHOUSES COAST-TO-COAST

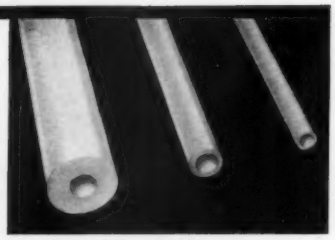


Cadco Teflon Rods
Finest quality, non-porous. Can be turned quite easily like soft brass on any standard metal working lathe. Complete range of diameters and lengths.



Cadco Bars and Cylinders
Triple "A" quality and uniform density. Easily machined. Available in various diameters and wall thicknesses. Also made to your specifications.

Cadco Teflon Sheets
In a wide range of sizes and thicknesses. Can be sawed, drilled, punched, stamped and sheared.



Cadco Teflon Tubing
Flexible and tough. Has wide useage for electrical, chemical laboratory and other applications. Complete range of diameters and lengths.

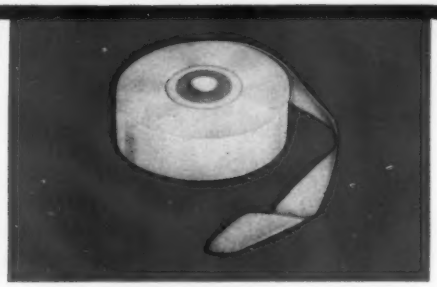
"cadco"

Manufactured

TEFLON SHAPES

SHEETS • TAPE • TUBING

RODS • BARS • CYLINDERS



Cadco Teflon Tape
Non-porous and extremely strong. Available in grades for mechanical, electrical and general purpose use.

In our new ultra-modern plant . . . "CADCO" brand TEFLON is manufactured under the most rigid controls to assure you of uniform high quality. Large production capacity enables us to maintain complete inventories for quick delivery on all orders.

Send for new "Cadco" Teflon Brochure and prices.

WRITE NEAREST ADDRESS OR REQUEST NAME OF DISTRIBUTOR IN YOUR CITY

cadillac plastic and chemical company

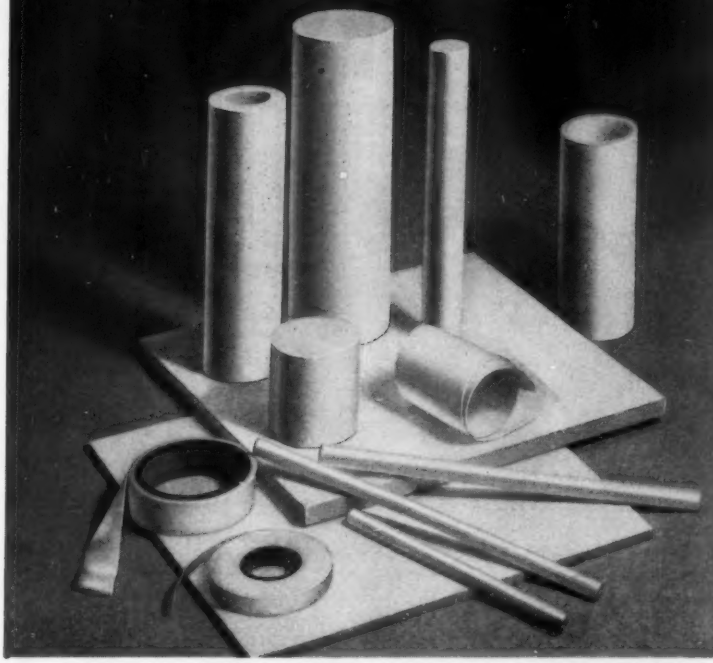
Detroit 3, Michigan, 15111 Second Blvd.

Chicago 6, Illinois, 727 W. Lake St.
Cleveland 13, Ohio, 3333 Detroit Ave.
Cincinnati 10, Ohio, 1200 Walnut St.
Milwaukee 2, Wisconsin, 517 N. Broadway St.
Los Angeles 57, Calif., 2305 W. Beverly Blvd.
St. Louis 3, Missouri, 2111 Olive St.
Kansas City, Missouri, 1517 Grand Ave.
Dallas 7, Texas, 2546 Irving Blvd.
South San Francisco, Calif., 313 Corey Way
Houston, Texas, 6426 Long Drive

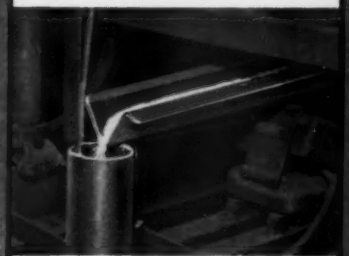
HEADQUARTERS FOR NEW IDEAS

For more facts circle 558 on Reply Card

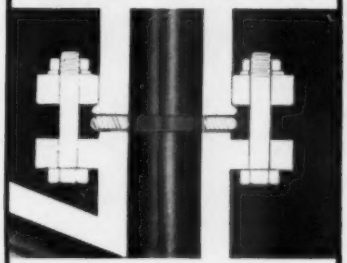
Reduce maintenance and repair costs...



VALVE SEATS of a Du Pont TFE resin recover from deformation with no damage, cost little, save over $5,000 per year in handling a sand-like chemical slurry.



5-MIL TAPE of a TFE-fluorocarbon resin lines vibrating trough. Liner prevents sticking of salts, provides constant feed, and eliminates maintenance.



GASKETS of a TEFLON TFE resin handle hot concentrated HNO_3 and H_2SO_4 at 410°F. Gaskets like these can be cut from standard sheet or tube.

EROSION SHIELD of a TFE-fluorocarbon resin snaps over impeller shaft nut of chemical pump, protecting it from rapid erosion by swirling reactants.

by stocking standard shapes of TEFLON TFE-fluorocarbon resins

Make standard shapes of TFE resins a mainstay of your maintenance. You get a quick and convenient way to handle on-the-spot repairs, and you save money by reducing or eliminating maintenance downtime at your worst trouble spots.

Repairs made with parts cut from standard shapes of TFE resins often last the lifetime of the machine or installation. Replacement parts of TFE-fluorocarbon resins owe their durability to the remarkable properties of these materials. TFE resins are rated for continuous use to 500°F, and they are outstanding sealing and bearing materials. TFE resins offer extremely low surface friction, extreme resistance to corrosive chemicals, extremely good electrical insulating properties. They provide anti-stick and liquid repellent properties, too.

See your local supplier of TFE resins for a good selection of standard shapes and start saving on repairs and downtime. For our new booklet "*How to Use Sheets, Rods, Tubes, Tape and Other Standard Shapes of* TEFLON", write today to your supplier or to: E. I. du Pont de Nemours & Co. (Inc.), Polychemicals Department, Room T-335, Du Pont Bldg., Wilmington 98, Delaware.

In Canada: *Du Pont of Canada Limited, P.O. Box 660, Montreal, Quebec.*

Unlike many other non-metallic materials, articles of TEFLON TFE resins can be ordered against meaningful specifications to insure your receiving a standard product. Your supplier, who fabricates TFE resins, is prepared to furnish you with stock shapes in the best combination of sizes and the best combination of properties.

DU PONT REG. U.S. PAT. OFF

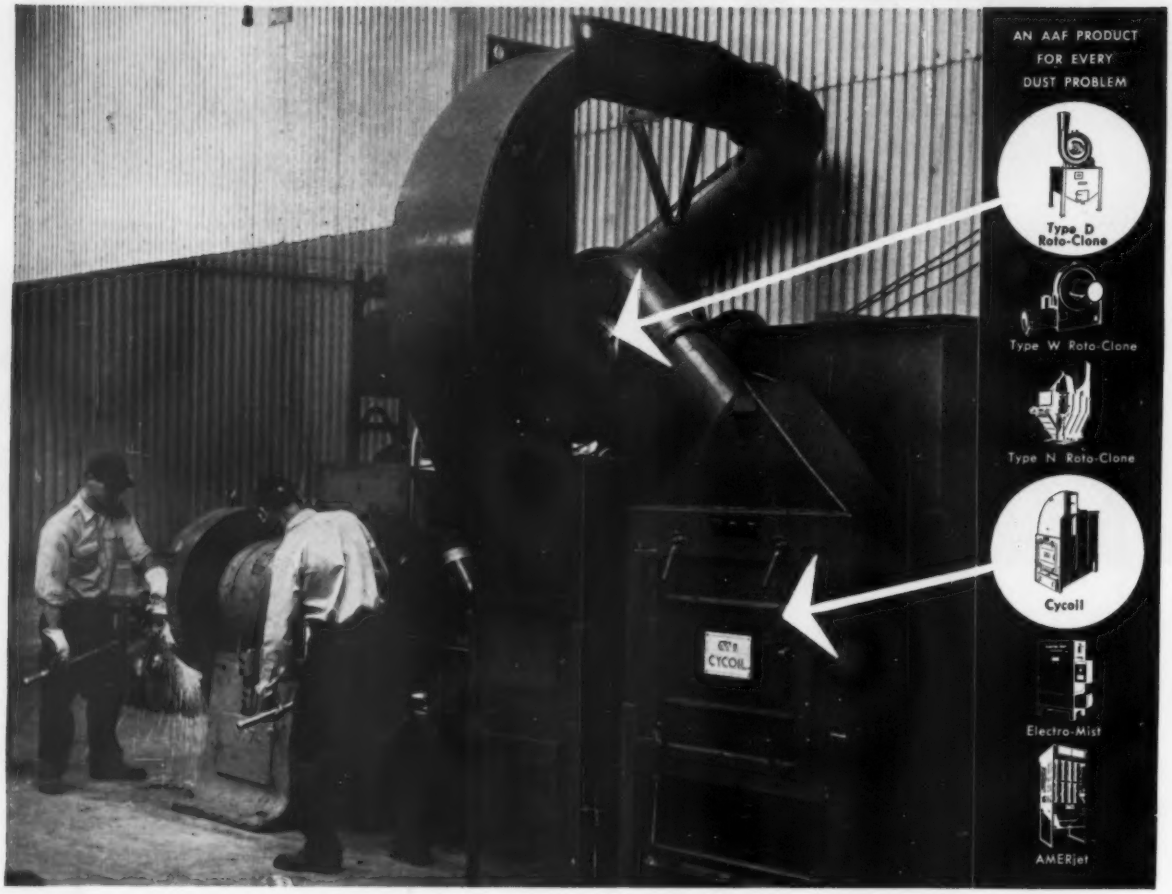
TEFLON®
TFE-FLUOROCARBON RESINS

TEFLON *is Du Pont's registered trademark for its fluorocarbon resins, including the TFE (tetrafluoroethylene) resins discussed herein.*

BETTER THINGS FOR BETTER LIVING...*THROUGH CHEMISTRY*

For more facts circle 559 on Reply Card

GRINDING



AAF ROTO-CLONE-Cycoil system saves money for Duer Spring Co.

● Here's what AAF's team of Type D ROTO-CLONE and Cycoil is doing for Duer Spring Company, McKees Rock, Pennsylvania: (1) eliminating *all* spring grinding dust, (2) saving on fuel bills by returning cleaned air to workroom, and (3) lowering maintenance costs by preventing oxidation to building. Most dust particles are removed by the Type D, and the Cycoil eliminates the rest!

AAF's complete line of dust control equipment was application-developed, now challenges *any* metalworking dust problem. Where are troublesome dust, fumes or mists causing you trouble—grinding, buffing, polishing, plating, dry machining, wet machining, heat treating, abrasive cleaning? All can be effectively and economically controlled by AAF.

If grinding dust is your problem, call your local AAF representative, or write direct for Type D ROTO-CLONE Bulletin 272A and Cycoil Bulletin 285A. Address Mr. Robert Moore, American Air Filter Co., Inc., 228 Central Ave., Louisville, Ky.

AAF American Air Filter

BETTER AIR IS OUR BUSINESS

For more facts circle 560 on Reply Card

COURT DECISIONS —a summary of legal findings of interest to the plant engineer

Prepared by Albert Woodruff Gray

Forfeiture for Nonpayment

IT WAS STIPULATED, under contracts for the rental of heavy construction equipment, that the lessee pay a monthly rental of $15,530 with an option for the purchase of the equipment for $155,300, less whatever rental payments had been made before the exercise of the option.

A voucher was attached to the check for final payment, saying that payment was a recapture of previous rental payments and the purchase of the property. Three days after the check had been deposited, it was returned by the bank with the notation "insufficient funds."

Upon receipt of the returned check, demand was made on the purchaser for the surrender of the equipment. The request of the purchaser that the check be redeposited was followed by a letter from the bank that the refusal to honor this check had been the mistake of the bank and that ample funds were available for payment. The seller refused to redeposit the check and continued his demand for the return of the machinery, refusing also a bank draft offered by the purchaser for the amount of the dishonored check.

In the suit brought by the purchaser for a judgment, the court, deciding in favor of the purchaser, said, "Absent a provision waiving demand for payment for rent or lease may not be forfeited for nonpayment of rental until demand has been made for payment thereof.

"It follows that the lease was not terminated for nonpayment. However if the lease had been subject to forfeiture for nonpayment of the rental the lessee would have been entitled to equitable relief from the forfeiture." Court brief 207 Fed. 2d 830, Oklahoma.

Right of Cancellation

A CONTRACT was made between a manufacturer and a customer in which it was stipulated, "The failure of the seller to make deliveries because of possible delays or any other cause shall relieve the seller of any liability for damages caused the purchaser and shall relieve the seller in addition from any obligation assumed under this contract. Seller shall not be responsible for purchaser's damages, if any, occasioned by delays in delivery regardless of cause."

When the manufacturer sued for the refusal of the purchaser to accept delivery of the goods and based its action on the contract, the New York court said of this provision:

"The practical effect of the foregoing language is to relieve the manufacturer of his obligation to perform the contract for any reason he chose to advance. Where a party to a contract retains an unlimited right to decide later the nature or extent of his performance, the promise is too indefinite for legal enforcement. The unlimited choice, in effect, destroys the promise and makes it merely illusory." Court brief 156 N.Y.S. 2d 309 New York.

Zoning Permit Granted

PREMISES IN A New York State village had been used by their owner for over 25 years for the storage and repair of construction equipment. Application by the owner to erect a concrete ready-mix plant on this land was refused by the village zoning board.

This land was located in an industrial district which had the following zoning ordinance, "Trade industry or use which is or may be injurious, noxious, offensive or nauseous by reason of vibration or noise or by the emission of odor, stenches, dust, smoke or gas."

This denial by the board to permit the erection of this ready-mix concrete plant was on the ground that the proposed use would involve vehicles of a gross weight of more than six tons and that under the ordinances of the village the use of the streets by vehicles in excess of that weight was prohibited.

The appellate court reversed the decision of the zoning board:

"The possibility that the owner might use excessively heavy trucks was obviously not a proper basis for the board's action. If the permit were granted the owner would, of course, have to comply with any valid ordinance regulating the weight of the trucks used by it. Neither was the board entitled to consider traffic hazards which might result from the proposed use." Court brief 176 N.Y.S. 2d 183, New York.

Permanent Position

UNDER AN oral agreement, an employee accepted a position on the promise of a salary of $300 a month, a bonus to be determined by the employing company's earnings, a possible increase in salary and the assurance by the employer that the position was permanent and would continue so long as his work was satisfactory.

Less than a year and a half later he was discharged and sued for damages for what he contended was a breach of the contract of employment. "There was no contract for employment for any definite time," said the court, in denying the employee a recovery.

"It was an indefinite hiring, merely a promise by the employer to employ this man as long as he did the work satisfactorily. But there was no counter-promise by him to work for the employer for any length of time. He was free to quit any time—to accept other employment whenever he chose.

"A contract of employment for an indefinite term may, in the United States, be terminated at the will of either party. A contract for permanent employment where the consideration is paid wholly or partly in advance, as by the relinquishment of a claim for personal injuries, or which is supported by a consideration other than a promise to render services, is not such an indefinite contract as to come within the rule.

"But a contract for permanent employment, so long as it is satisfactorily performed, which is not supported by any consideration other than the obligation of services to be performed on the one hand and wages to be paid on the other, is terminable at the pleasure of either." Court brief 228 S.W. 2d 122, Tennessee.

Assumption of Risk

ENGAGED IN assembling sugar cane grinding mills, an employee of a Missouri foundry, fitting dust guards to the grinding rollers, was chipping them to size with a cold chisel when he was injured by a piece of metal hitting him in the eye.

He was an experienced machinist and familiar with the type of work he had undertaken and, as the court pointed out, knew that when he set a cold chisel against metal and hit the head of the chisel pieces of iron would fly.

In its refusal to allow a recovery for these injuries, the court said: "Such risks are purely incidental to the employment and such an injury is liable to occur at any time during the performance of the work undertaken, un-

COURT DECISIONS

aided in any degree by the negligence of the employer.

"But suppose on the other hand, the injury had occurred to his eye by reason of a sliver of steel flying from a defective and dangerous hammer negligently furnished by the employer, while he was pounding the iron mentioned. Such injury would be the result of the negligence of the employer." Court brief 229 S.W. 803, Missouri.

Responsibilities of Engineers

RESPONSIBILITY of an engineer to his employer are governed by the same duties and obligations of any other professional worker. In the decision of a suit for professional services in the preparation of plans and specifications before the Maine Supreme Court many years ago, it was said:

"The responsibility is essentially the same as that which rests upon the lawyer to his client or upon the physician to his patient or which rests upon one to another when such person pretends to possess some skill and ability in some special employment and offers his services to the public on account of his fitness to act in a line of business for which he may be employed.

"But the undertaking does not imply or warrant a satisfactory result. There is no implied promise that miscalculations may not occur. An error of judgment is not necessarily evidence of a want of skill or care, for mistakes and miscalculations are incident to all the business of life." Court brief 36 Atl. 104, Maine, May 7, 1896.

Patent Infringement

CLAIMS OF patent infringement were the subject of a suit brought by the patentee of a stress gage. Use of this gage, as described by the court, was, "The purpose of this gage is to measure strain. The load or force which is applied to a body is known as 'stress.' When a body is subjected to stress it is deformed to some extent. The deformation is known as 'strain.'

"The gage employs the principle, discovered by Lord Kelvin more than a century ago, that the electrical resistance of materials which are electrically conductive varies with the strain thereof."

These charges of infringement were met by the assertion as a defense that the patentee had come into court with unclean hands, that it had implemented its patent of this gage to the illegal extension of its patent monopoly by "tie-in" sales.

In the denial of the right of the patentee to a recovery for the claimed infringement of the patent, the Federal District Court in Pennsylvania said: "For years it has been the patentee's policy to refuse to sell its gages to persons who might desire to use them with strain-sensitive apparatus unless the persons bought both the gages and the apparatus from the patentee.

"The enforcement of this policy constituted an illegal extension of the monopoly conferred by the patent on the gage beyond that contemplated by the patent grant. This misuse is a bar to the enforcement of the patent, regardless of whether these activities constituted a violation of the anti-trust laws." Court brief 120 U.S.P.Q. 34, Pennsylvania, December 26, 1958.

Repairman's Lien

WHEN A mortgagee of equipment sued for possession upon the default of the mortgagor in making payments as had been agreed, the defense was set up that this equipment was held as security and subject to a lien for repairs.

At the time the machine had been sold, a chattel mortgage had been given by the purchaser as security for the unpaid balance. The mortgage had been properly filed. Later when repairs were necessary, work had been done to maintain the equipment in proper condition, for which payment had not been made.

The mortgage clause read: "Mortgagor agrees to keep said property in as good condition and repair as it now is, ordinary wear and tear excepted."

Statute in this state, essentially the same in all states, reads: "All artisans and mechanics have a lien on things made or repaired by them for the amount due for their work and may retain possession thereof until said amount is paid.

"Any person or corporation who repairs any motor vehicle or furnishes parts therefor at the request or with the consent of any person lawfully in possession of any such motor vehicle, shall have a lien upon such motor vehicle or any part or parts thereof for the sum due for repairing the same and for labor furnished thereon."

Against this defense the mortgagee argued that this repairman could not have acquired such a lien since the work had not been done on the repairman's premises nor in its shop but wherever the equipment happened to be.

Sustaining the right of the repairers to this lien, the Supreme Court of New Mexico said that exclusive possession of such equipment by the one making the repairs was not essential to a lien. That for the purpose of making repairs the mortgagee had given the repairers a qualified custody. Otherwise no one could ever acquire a lien as security for services of this sort on equipment that was too large to be conveniently moved from the mortgagor's premises. Court brief 288 Pac. 2d 1073, New Mexico.

Overtime Pay

ACTION WAS brought before the United States Supreme Court by the Secretary of the Department of Labor against an engineering firm. The Federal Government sought to restrain this engineering firm, which employed between 65 and 70 workers, from what the department claimed was a violation of the overtime provisions of the Fair Labor Standards Act, in failing to pay these employees time and a half for overtime.

It was conceded both by the Government and the employer that the professional employees—engineers and architects — were exempt from the coverage of the act, but the Government claimed that such a concession did not extend to clerks, stenographers and minor employees.

In holding such employees within the coverage of the act, the court said: "Where employees' activities are related to interstate instrumentalities or facilities, such as bridges, canals and roads we have used a practical test to determine whether they are 'engaged in commerce.' The test is 'Whether the work is so directly and vitally related to the functioning of an instrumentality or facility of interstate commerce as to be in practical effect a part of it, rather than an isolated local activity.'

"Coverage in the instant case must be determined by that test, for the draftsmen, fieldmen, clerks and stenographers all work intimately with the plans and specifications prepared by the employer for the repair and construction of various interstate instrumentalities and facilities including air bases, roads, turnpikes, base terminals and television installations.

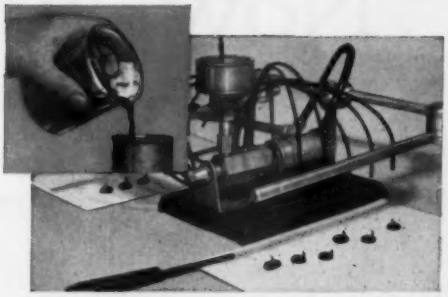
"In our view such work is directly and vitally related to the functioning of these facilities because without the preparation of plans for guidance the construction could not be effected and the facilities could not function as planned." Court brief 27 Law Week 4071, U.S.Sup. Ct., January 12, 1959.

For more facts circle 529 on Reply Card ⟶

Bertsch & Co. finds solution to lubrication problem...with Standard Oil's

RYKON Grease R

Centralized lube system pumps grease through 80 ft. lines in cold temperature; no clogging



Lab demonstration shows how RYKON Grease R works. Grease is poured into reservoir as a fluid. The shearing action exerted by pump and outlets irreversably converts fluid to a grease. Grease is ejected from outlet lines.

Problem: Bertsch & Company, Cambridge City, Indiana, makes pinch rolls and other metal bending equipment. A centralized lubrication system used on one pinch roll model had to pump grease 80 feet. Greases tried could not be pumped this distance without clogging lines. Since machines are shipped all over the world and are often in operation in cold climates, Bertsch had additional problems. The grease had to be pumpable in cold temperatures. It had to be foolproof so that customers beyond the reach of service calls would experience no problems.

What was done: Bertsch turned to Standard Oil for help. Standard Oil man, D. M. Simmons had the answer: RYKON Grease R. This is a rheopectic grease, one that flows like an oil. Its rheopectic properties cause it, under slight shearing stresses, to turn to a thick, durable grease. RYKON Grease R flows to the pump as a fluid, lubricates the bearings as a grease.

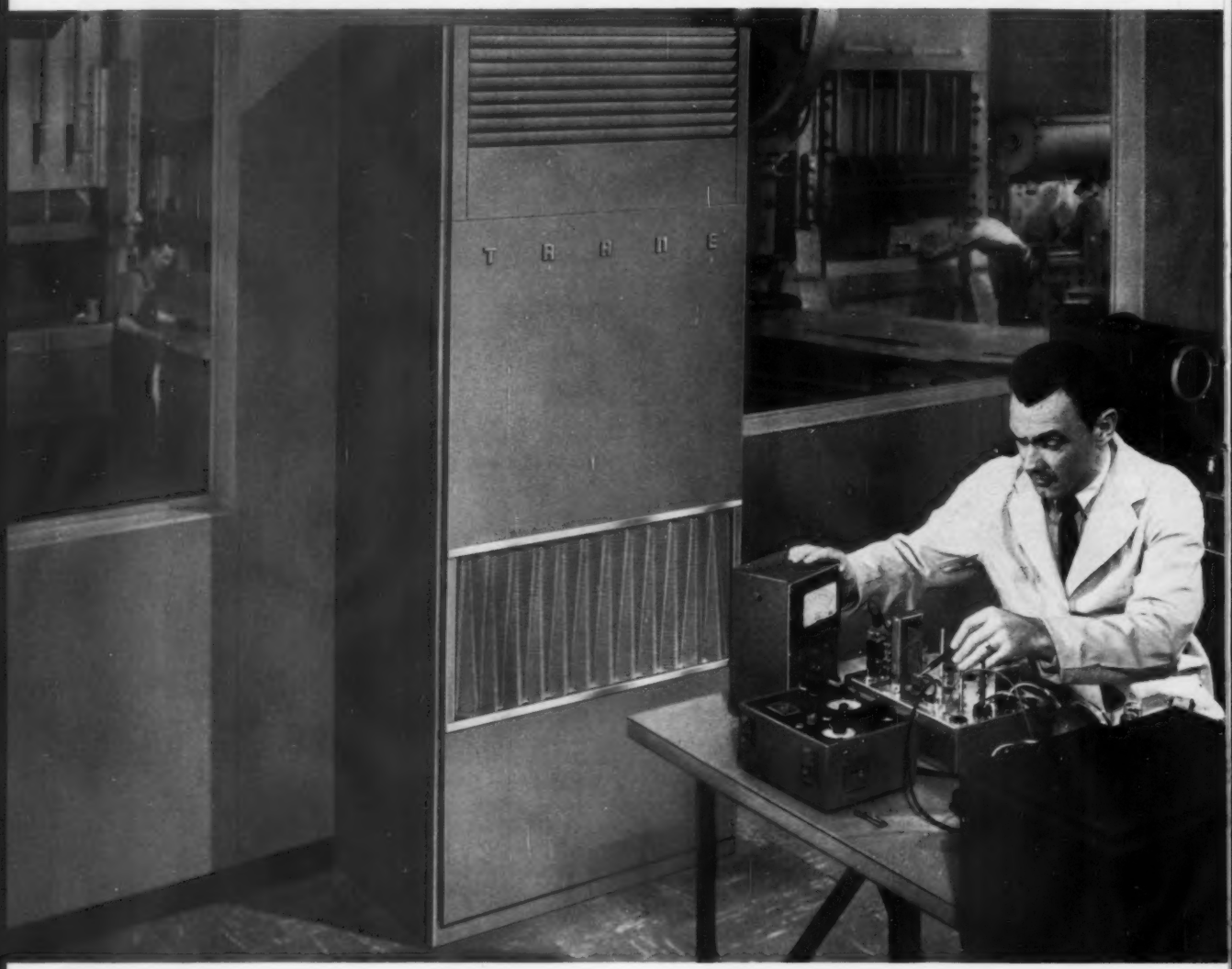
What you can do: Maybe you manufacture equipment that needs a centralized lubrication system and you have been looking for a grease like RYKON R. Get the facts about RYKON Grease R from your nearby Standard Oil lubrication specialist anywhere in the 15 Midwest and Rocky Mountain states. Or write **Standard Oil Company (Indiana), 910 South Michigan Ave., Chicago 80, Illinois.**

You expect more from **STANDARD** *and you get it!*

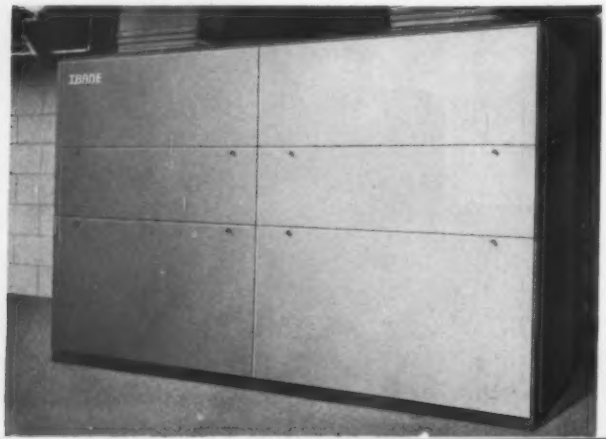
Sons of founder, Harry E. and Robert O. Bertsch talk with Standard Oil lubrication specialist Donald M. Simmons. Don is well qualified to work with customers on difficult lubrication problems. He has the training and experience for it. Don graduated from Purdue. He has seven years service with Standard. He has completed the Standard Oil Sales Engineering School.

plant areas with

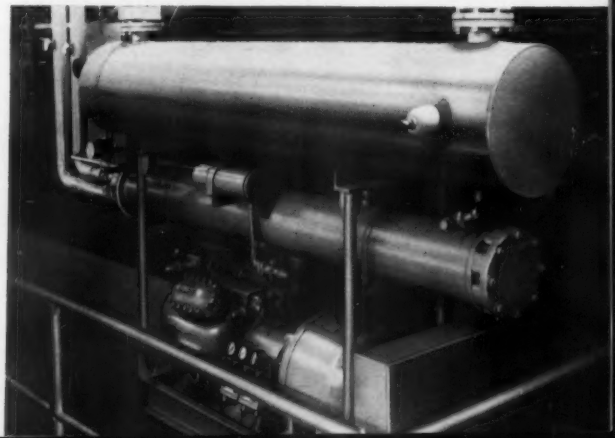
Now! Air condition key Trane Self-Contained



Cool larger areas with this newly designed commercial size TRANE Self-Contained unit. Usually installed outside the conditioned space, it delivers a large volume of conditioned air. 20, 25 and 30-ton models with water or air-cooled refrigeration system. 10, 15 and 20-ton models with built-in water saver.



Chilled water for central air conditioning systems or for process cooling is provided by this TRANE Cold Generator. Factory-assembled for fast, easy installation. Features new compressor, designed for either R-22 or R-12 refrigerant. Four-step compressor modulation cuts power costs.



plant areas with Climate Changers!

Cool laboratory, offices, drafting room—on a budget—with a quiet, efficient packaged unit

Here's how you can cool critical areas in the plant—have just the cooling you want, where you want it! Install one or more TRANE Self-Contained Climate Changer units and enjoy *high production climate* . . . peak performance, with a trim, compact packaged unit.

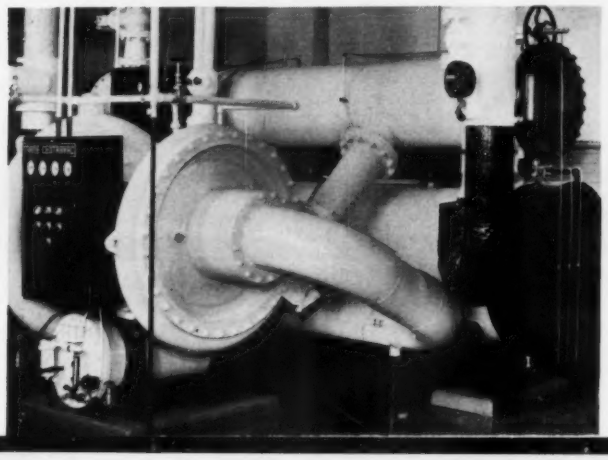
These units provide crisp, cool air for special areas in the manufacturing plant where summer heat reduces efficiency, lowers production. Install them in the laboratory, drafting room, offices—wherever you need summer cooling on a budget.

Designed and built by a leader in big building air conditioning systems, these new TRANE Climate Changer units give you traditional TRANE engineering excellence, dependable performance. And they're especially *quiet*—won't disturb personnel. Self-Contained Climate Changers may be installed right in the conditioned space—or located remotely, with a simple ductwork system bringing in the cooled, filtered, de-humidified air. And there are Climate Changer units in all sizes from 3 to 30 tons, air or water-cooled, to meet the cooling requirements of any space within your plant.

WANT MORE FACTS? When you plan cooling for your building—for limited areas or for the entire plant—turn to TRANE! Have your architect, contractor or consulting engineer talk with your nearby TRANE Sales Office. Or write TRANE, La Crosse, Wisconsin.

◀ This TRANE Self-Contained unit provides cooled, filtered, dehumidified air for offices or critical plant areas. And it needs no water! Air-cooled, it's easy to install, quiet in operation.

For larger jobs, a TRANE CenTraVac provides chilled water for comfort or process cooling . . . sizes to 1500 tons. Available in electric or steam driven models; open or hermetic design. All models modulate to 10% of capacity—or lower—with power savings in almost direct proportion to load. Fully automatic, no full-time attendant needed.



For any air condition, turn to

TRANE

MANUFACTURING ENGINEERS OF AIR CONDITIONING, HEATING, VENTILATING AND HEAT TRANSFER EQUIPMENT

THE TRANE COMPANY, LA CROSSE, WIS. • SCRANTON MFG. DIV., SCRANTON, PA.
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OF CANADA, LIMITED, TORONTO • 97 U.S. AND 19 CANADIAN OFFICES

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URIS BROTHERS, *Owner and Builder*
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EMERY ROTH & SONS, *Architect*
FISCHBACH & MOORE, *Electrical Contractor*

ANOTHER BUSS HI-CAP AND FUSETRON FUSE INSTALLATION

Electrical Protection goes MODERN *with* BUSS Fuses at 485 Lexington Ave., New York, N.Y.

In keeping with the modern trend the electrical protection for this new 30 story office building is BUSS Hi-Cap and FUSETRON dual-element fuses.

No other type of protective device can match fuses in providing the high interrupting capacity and dependability required for today's circuits.

BUSS Hi-Cap fuses have a NEMA interrupting rating of 200,000 amperes rms symmetrical. FUSETRON dual-element fuses have a NEMA interrupting rating of 100,000 amperes rms symmetrical.

Main Switch Board—BUSS Hi-Cap *and* FUSETRON fuses

Estimated available fault current is between 140,000 and 150,000 amperes.

with fuses— safe protection remains safe!

Unlike mechanically operated devices, a fuse has no hinges, pivots or contacts to stick or get out of order. Dust, fumes corrosion or age cannot increase a fuse's capacity or lengthen its blowing time.

After years of inactivity, a fuse will give the same safe, dependable protection if called upon to open as it would have on the day it was installed.

If a fuse does blow, there is no recalibration needed. As quickly as the fault in the circuit is corrected, you slip in a new fuse, that has been CALIBRATED AT THE FACTORY BY ENGINEERS.

for more information

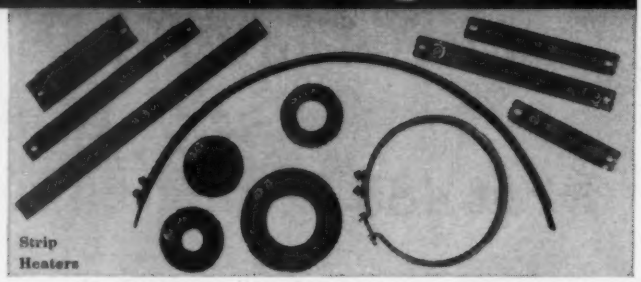
On BUSS Hi-Cap Fuses..... write for bulletin HCS
On FUSETRON dual-element Fuses..write for bulletin FIS

Distribution Panels
PROTECTED BY FUSETRON FUSES

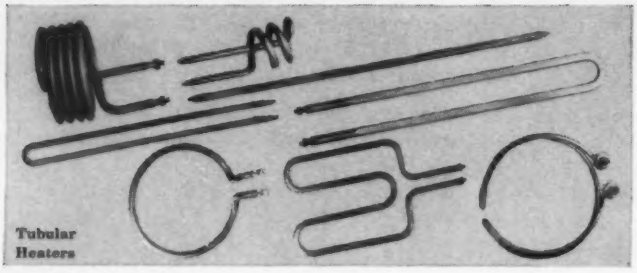
BUSSMANN MFG. DIV., McGRAW-EDISON CO., ST. LOUIS 7, MO.

For more facts circle 563 on Reply Card

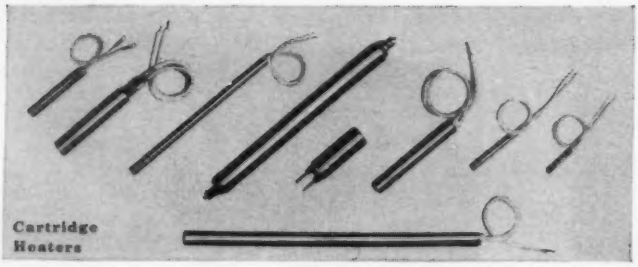
Call your CHROMALOX Man for the heating answers



Strip Heaters



Tubular Heaters



Cartridge Heaters

These 3 basic CHROMALOX heaters provide answers to just about any heating problem

Strip Heaters . . . that quickly and easily bolt or clamp to platens, dies, kettles, tanks, pipes, rolls, drums, ovens and air ducts. Lengths from 4 to 96 inches, widths from ¾ to 2½ inches, with cross section curving or lengthwise bending. Available with brazed-on fins.

Tubular Heaters . . . that clamp on, fit into machined grooves, cast into metals, immerse in liquids, install in ovens and ducts. Straight lengths or factory-formed to nearly any contour. Lengths from 6 inches to 30 feet. Triangular or round cross section. Available with brazed-on fins.

Cartridge Heaters . . . that smoothly fit standard drilled holes in dies, platens, molds, extrusion and injection barrels. Special leads available for protection against flexing action, abrasion, moisture or vapors. Diameters from ⅝ to 1¹⁵⁄₆₄ inches, lengths from 1⅜ to 25⅜ inches.

Versatile Chromalox electric heaters are available in sheath materials and wattages to match almost any application to 1100°F. Easy to install, they are fast, clean, safe and economical.

Your Chromalox Man can help you determine the one that best answers your specific problem. He's backed by the world's largest factory stock of industrial heaters, ready for immediate shipment. Why not give him a call. You'll find his phone number listed at the right.

Our new Catalog 60 provides detailed product information and suggests numerous applications for the complete line of Chromalox electric heaters for industry. If you have not yet received a copy, please let us know. 1801

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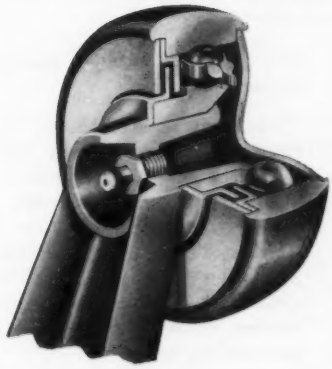

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These important advantages, designed to assure dependable, trouble-free service, are as follows . . . TRIPLE LABYRINTH SEAL, locks-out dust and dirt, retains lubrication . . . PROTECTED ALEMITE FITTING, placed "out-of-the-way," cannot be knocked off . . . BALL RETAINER, minimizes ball wear, traps lubricating grease and prevents churning . . . SWAGED WHEEL and SIDE ARM CONNECTION, eliminates wheel loosening as occurs in old fashioned nut and bolt connections . . . OUTERRACE OF WHEELS MACHINED and HEAT TREATED for long-life service . . . DESIGNED TO PROVIDE MAXIMUM LOAD CAPACITY.

YOU ARE CORDIALLY INVITED to visit with us during The Material Handling Institutes Exposition of 1959. See us in Booth 1414 on the lower level of the Cleveland Public Auditorium, June 9-12.

R-W 458 Chain Conveyors provide an important addition to the present line of R-W overhead conveying systems . . . in fact, this addition permits R-W to offer the most complete line of overhead conveying systems available. All are designed and planned to increase production efficiency, lower operating costs and provide a profit-improvement. R-W 458 Chain Conveyors are easy and economical to install, operate and maintain . . . may be added on to existing systems as track and components are manufactured to meet industry standards of size. R-W track and components offer the additional advantage of being designed and manufactured to meet R-W's strict quality control standards . . . standards that are set up to assure you of receiving dependable, long-life service and trouble-free operation with minimum maintenance.

Whatever your conveying problem — from basic systems to intricate automatic dispatch systems there is an R-W overhead conveying system to meet your exact requirements. Write today or contact your local R-W Sales Engineer for complete information.

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New C&D AccuPak*

plates improve battery performance; increase life!

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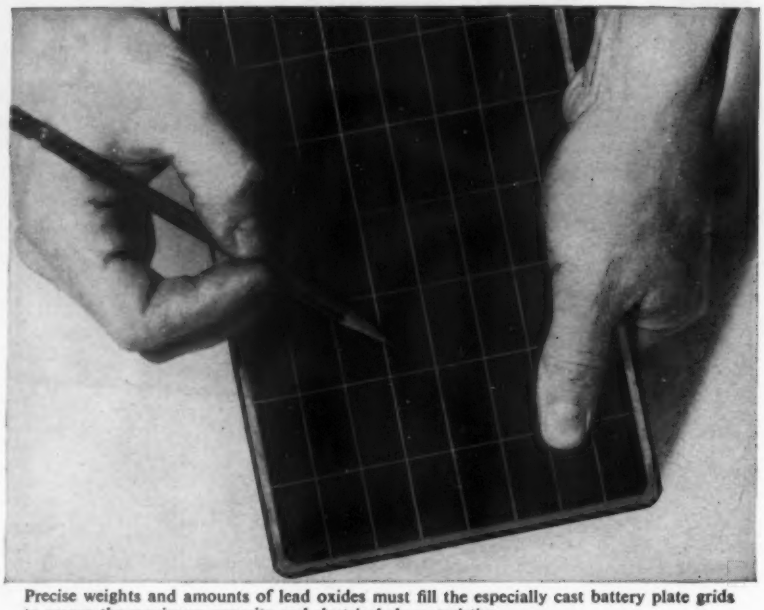
Automatic nuclear control holds plate uniformity to finest possible tolerance; provides 100% inspection!



Precise weights and amounts of lead oxides must fill the especially cast battery plate grids to assure the maximum capacity and electrical characteristics.

Electric truck battery users will find three major advantages in C & D *Slyver-Clad*® batteries containing the exclusive, new *AccuPak** plates:

1. Extra long life—because of longer, thicker plates.

The true final determinant of battery life is the amount of metal in the grids. C&D batteries outlast any other battery because they have the heaviest, thickest plates made. The maximum cross-sectional area grid is cast by a special process that eliminates flaws, shrinkage, cracks, and dross inclusions.

2. Extremely uniform *AccuPak* plates; no low cells; high capacity to end of life—due to *AccuRay* control of pasting.

C&D uses *AccuRay*** to automatically control the amount of active materials going into the grid structures of *both positive and negative plates!* C&D is the only industrial battery manufacturer using *AccuRay* control.

The use of *AccuRay* to control the pasting operation means that plates have maximum uniformity of weight, density, and thickness of active material. *AccuRay* controls uniformity to within ±½% and automatically subjects every plate to a 100% inspection.

Exclusive *AccuRay* control—another C & D first—once again sets the pace for the battery industry. *AccuRay* automatically controls weights of all battery plates to a point of uniformity heretofore impractical.

3. No life-shortening nor capacity drop-off due to sediment build-up—because of *Slyver-Clad*® insulation and retention.

The longer, heavier, more uniform plates are then wrapped with the time-proven C&D *Slyver-Clad* five-fold insulation. This consists of a layer of extremely fine parallel glass filaments or sliver, a vertical glass wrapping, a horizontal glass wrapping, a perforated plastic retainer, and finally a microporous rubber separator.

The combination of these five layers of retentive materials virtually eliminates shedding, or loss of active material, with its accompanying life-shortening build-up of sediment in the bottom of the container. Thus, a huge bottom sediment space is not needed. C&D fills this space in standard containers with the heaviest, thickest plates available in any industrial battery.

For full information on C&D *Slyver-Clad* batteries featuring *AccuPak*, write for Bulletin IT-530.

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WHAT'S JUST AHEAD IN THIS ISSUE?

- BREAK-EVEN point between induction motors and capacitors versus synchronous motors for various speeds and sizes is easy to determine from tables found in the article starting on the next page. Three methods of applying capacitors to motors, together with advantages and disadvantages of each are also discussed.

- BUILDINGS can vary, from a simple low-cost shell to a structure that reflects a cost figure far above that of the ordinary industrial plant. When you can build a plant that combines the best features of these two extremes . . . low cost and more-than-adequate facilities . . . there's a story to tell. Motorola, Inc., did it, and the story of the cost-cutting ideas they used appears on page 96.

- RUSTING of spare maintenance parts may be doubly expensive. When you need the part and find out, too late, that it has rusted you must buy a new part. But, even worse, the time wasted in getting another replacement part may hold up production. There are many rust preventives on the market and many of them are specialized. To know just what's available and where to use each, read the article on page 101.

- AUTOMATION and its attendant computers may be very real threats to production personnel and their jobs—but to plant engineers and maintenance men they look like a collective Moses ready to usher them into the Promised Land. Not only will these mechanical brains force the men who take care of them to become better trained "doctors" of maintenance, they will also clothe him with the same professional dignity enjoyed by most doctors. To get a quick glimpse of just what computers are already doing, read the article starting on page 105.

- OVER THE years many methods of combatting boiler scale and sludge have been developed. One of the newest is a filter system which works hand-in-hand with any internal boiler water treatment. For details of the system's operation and the results of tests run on plant boilers, turn to page 119.

- "IF YOU can't hammer it, blast it!" That might well be the maxim under which the explosive-forming researchers are now working. Explosives can now handle the tough metals such as stainless steel and titanium with ease. Just what this means to the plant engineer in the way of new and safer facilities is explained in the article on page 124.

- AT KAISER Aluminum's Ravenswood plant, the use of microfilm has found an important spot as a tool for the engineering department. How it is used, and the many services it performs, are described in the article starting on page 132.

ECONOMICS OF MOTOR POWER FACTOR

How do you determine relative cost advantages of synchronous equipment versus induction motors and capacitors?

By S. R. REAS, Industry Control Dept., General Electric Company, Roanoke, Virginia

PARTIALLY-LOADED induction motors are the largest single cause of poor power factor in the average industrial plant. The main reason for partial loading is that drive motors are frequently selected for peak load requirements and then run at an average load level. Another contributing factor is the intermittent nature of many machine operations with the result that motors run idle for long periods of time.

Other contributing factors to low power factor are the replacement of incandescent lamps with fluorescent, use of rectifiers instead of synchronous motor-generator sets for d-c power requirements and the increased use of various induction devices, electronic equipment and air conditioning. There are many benefits to power factor improvement but the two main ones are reduction of power costs and the release of distribution system capacity.

In the past when power factor correction was under consideration, the synchronous motor was usually chosen on the basis that it gave free power factor improvement. Actually it is often more advantageous economically to purchase an induction motor and capacitors.

Synchronous motors have an advantage in that they supply smoothly varying values of kilovars by adjustment of the motor field rheostat. However, they have a disadvantage in that they must be in operation to produce these kilovars. This can be important from a loss standpoint if the synchronous motor must be operated just to produce kilovars.

The capacitors in the induction motor-capacitor system need not be connected and switched with the motor but can be permanently connected to the power system, thus producing kilovars at all times. The maintenance of the synchronous motor, the necessary exciter and associated control equipment is apt to be more costly than a comparable induction motor-capacitor system.

On the other hand, to produce the same power factor improvement from the induction motor-capacitor arrangement as from an 0.8 leading or unity power factor synchronous motor would require more capacitors than could be safely switched with the motor. This would require a separate switching device for the capacitors. At low voltages this switch is relatively inexpensive but above 600 volts the cost becomes appreciable.

Initial cost is perhaps the best guide in making the selection between the induction motor with capacitors and the synchronous motor. Table shows motor ratings where the cost of the induction motor, motor starter, capacitors and capacitor switching device is less than an 0.8 leading or unity power factor synchronous motor, exciter and starter. Capacitor ratings in this table were selected so as to give the same amount of power factor improvement at full load as a 0.8 leading or unity power factor synchronous motor of the same horsepower rating.

Frequently it is desirable to im-

Table shows comparison of induction motors and capacitors to three types of synchronous drives. Induction motors are cheaper at these and lower ratings.

	Synchronous Drives*		
	0.8 Lead Full Voltage Starter	Unity Power Factor Full Voltage Starter	Unity Power Factor Reduced Voltage Starter
Motor Speed rpm	Horsepower		
600	200	300	300
900	150	300	300
1200	150	350	350
1800	250	750	400

*Note—440 and 550-v, 60 cycle equipment

prove the power factor only to around 95 per cent and in these cases the capacitors can usually be safely switched with the motor. This would make the induction motor-capacitor arrangement attractive for motor horsepowers much higher than those shown in the table.

Due to the high cost of the capacitor switching device for 2300 and 4160-v services, synchronous motor equipment applied at these voltages costs less than the induction motor equipment over the entire horsepower range. However, if only 95 per cent power factor is required, the capacitor switch may be eliminated and the use of a simple induction motor-capacitor arrangement again becomes very attractive economically.

Here are some facts we must keep in mind when applying capacitors to induction motors. Reference to Fig. 1 shows that an induction motor has a fairly good power factor at full load but this drops off rapidly at light loads. Although power factor varies materially from no load to full load, motor kilovar requirements remain substantially constant.

Applying a capacitor having a kilovar rating equal to the no-load motor kilovar requirements, we can improve the power factor at no load to 100 per cent which will result in a full load power factor of approximately 95 per cent. The power factor curve will be practically flat since net kilovars will be very small in comparison with kilowatts.

Applying Capacitors to Motors

Induction motor applications generally have three locations where power factor correction capacitors are connected. They can be connected on the load side of the starter, Fig. 2a, at the starter on the line side of the overloads, Fig. 2b, or on the power bus, Fig. 2c. The preferred and most advantageous location from an electrical standpoint is either the method shown in Fig. 2a or Fig. 2b.

In both of these cases the capacitor and motor are switched as a unit so that the capacitor is always in service when the motor is operating. If the connection, Fig. 2a, is used it is imperative that the overloads be properly sized for the decreased line

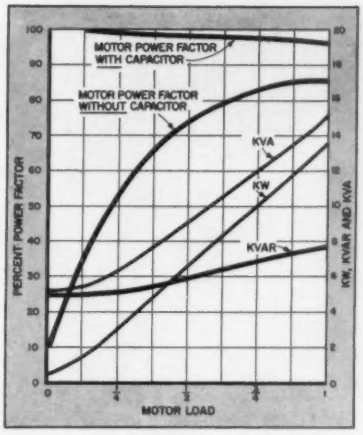


Fig. 1. Characteristics for typical medium size and speed induction motors.

current which will flow through them. If capacitors are connected at the motor and the overloads are not changed to the proper value, the motor could draw currents of damaging proportion while the line current could be under the overload trip value.

Using capacitors with a motor does not require any change in the current carrying capacity of the controller. The capacitive current drawn serves merely to balance out the inductive current requirements of the motor. Consequently, the over-all line current will not be increased.

Capacitor connections as shown in Fig. 2a, are generally preferred for new installations where the overloads can be selected at the time of purchase. This connection also has the advantage of less available short circuit current at the capacitor due to the impedance of the overload relay.

Connections shown in Fig. 2b, are preferred for existing installations since no change in overloads need be made because the current through the overload is still the motor current. Connections shown in Fig. 2c, are used when capacitors are permanently connected to the system. The main advantage of connecting them in this manner is the elimination of the separate switching device usually needed for the capacitors.

With power factor correction capacitors there are definite limitations on the value of the capacitor when both the capacitor and motor are switched as a unit. The two factors which limit the value of the capacitors are the overvoltage caused by self-excitation of the motor and transient torques.

Considering the factor of self-excitation we must remember that the capacitor is supplying kilovars to balance out the magnetizing requirements of the motor during normal operation. When the motor and capacitors are disconnected from the line, the capacitor will continue to supply the kilovars needed to meet the requirements of the motor magnetizing current.

Under these conditions the motor will self-excite or act as a voltage generator. The magnitude of this voltage will depend upon capacitor current and motor speed. With capacitors sufficient to correct power factor to 100 per cent at full load, it would be possible to obtain self-excitation voltage of 140 to 150 per cent. This is particularly important in the case of motors driving high

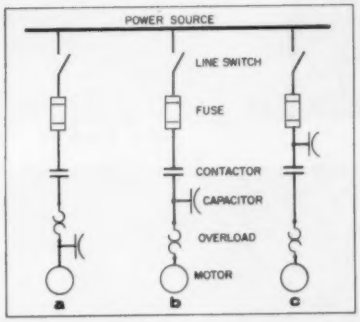


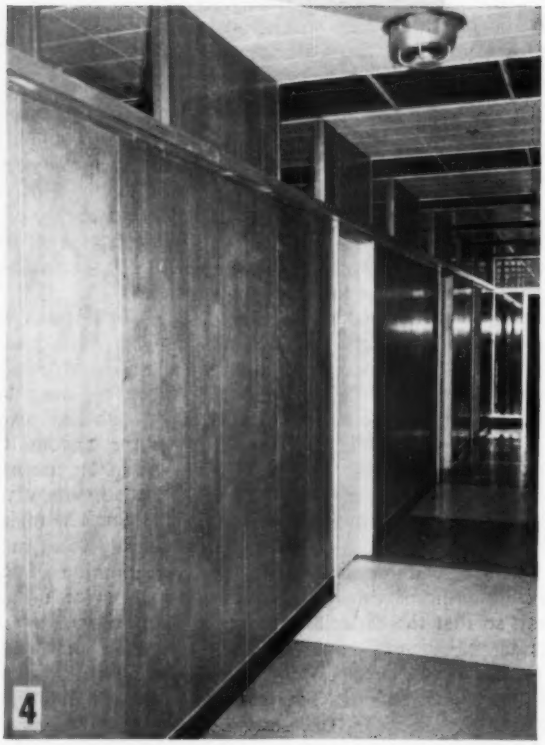
Fig. 2. Three methods of connecting capacitors. Each has certain advantages.

inertia loads since the overvoltage can be maintained for quite some time.

Overvoltage and transient torque effects can be experienced when capacitors are connected to a bus serving a group of motors similar to the connection shown in Fig. 2c. However, if the power factor is improved to less than 95 per cent under all load conditions there will seldom be any overvoltage or transient torque problems.

In some cases it may be economical to improve power factor above 95 per cent and in these cases separately switched capacitors should be used with appropriate power factor sensitive type controls. **End**

5 IDEAS for low cost buildings . . .

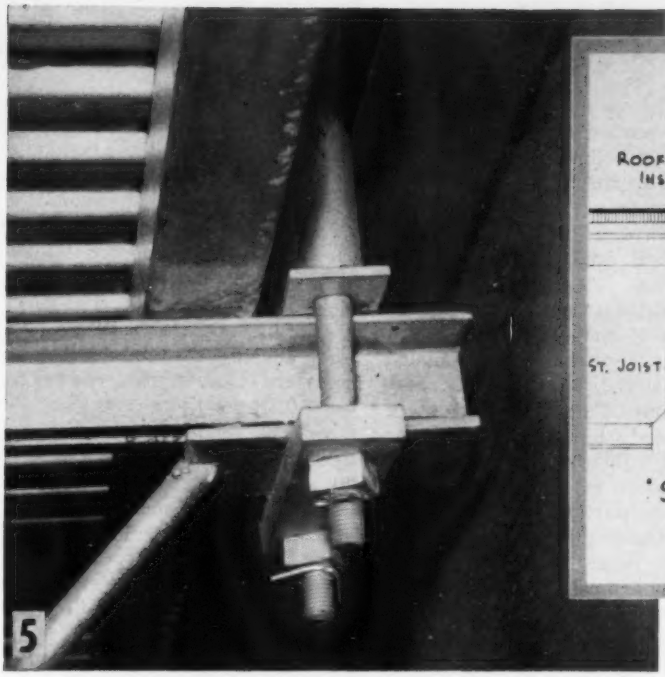


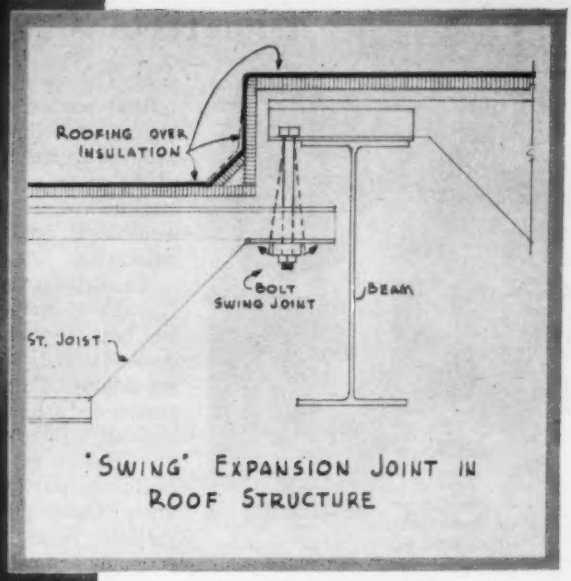
1 Unit heater, set on roof in upside-down position, takes no in-plant space, leaves assembly floor clear.

2 Exhaust grille for air-conditioning system set in brick column. Flue tile liner inside column carries air flow.

3 Steel pipe storm drain suspended from overhead makes underfloor lines unnecessary. Line is dead level.

4 Pre-finished flush doors form wall panels. Vinyl tile on floors, metal ceiling tile, are maintenance savers.





Closeup and drawing of swinging joist construction. Drawing shows how roof forms unbroken cover requiring no expansion joint.

PLUS MAINTENANCE SAVERS— from Motorola, Quincy

WHEN YOU BUILD a plant and load it with extras, you don't expect to have a low price tag . . . but Motorola's plant in Quincy, Illinois, had just that. Big —187,000 sq ft, including 15,000 sq ft of office area and 5000 sq ft of cafeteria—the plant contains many bonus features in its construction, materials selection and maintenance considerations.

To get these extras, yet maintain the low cost per square foot, architect John A. Benya, Quincy, incorporated some unique ideas into his design.

The building foundation is a continuous concrete-filled trench. The trench walls, excavated by a digger, served as forms, and support for the building walls comes from the "bulb" at the base of the foundation. The width of this bulb was dependent on the load it was to carry.

Next, a cost-cutting idea in the mason's job: modules of 40 in. permitted erection of the building walls without cutting a single brick. And, vertical expansion joints were placed in the exterior walls, on 10-ft centers (every third module.)

Tricks With Anchor Bolts

Structurally, the use of double-nut column anchor bolts permitted the rapid adjustment and alignment of the building columns. Each column could be aligned and leveled individually, ready for ironworkers to place beams with a minimum of effort and delay.

These anchor bolts, mounted in the column footings, were used to adjust and lock the plate welded to the base of each column. The plate, actually supported by the bottom nut on each foundation bolt, was grouted in after the top of the column was aligned, ready to receive steelwork with a little or no "juggling."

The steel beams, too, had a share in the unusual design of the building; Charles Macklin, of Springfield, Ill., was consultant. To obtain continuous beam action without using full-size beams in areas where their strength was not needed structurally, the major beams were cantilevered past the column supports and a smaller beam bolted between the ends.

Using this idea, the structural effect of a continuous beam was achieved, without spending the money necessary for heavy beam sections throughout the plant.

Ordinarily, expansion joints in buildings require double beams and double columns at each joint. An innovation by the architect at this point permits a single beam and

column to perform the support function.

At each expansion joint, the end of each joist is suspended from, rather than bolted securely to, the flange of the beam by a pair of sleeved bolts. This suspension permits the joists to "swing" with expansion and contraction.

Suspension of the joist, however, drops it some nine inches below the beam supporting it. Therefore, the roof line is stepped at these points. In keeping with the "character" of the designs, this step has been converted into a functional part of the roof, by making it the expansion joint. Though not a true joint, the vertical portion of the roof covering acts in bellows fashion, moving with the expansion and contraction of the structural steel. The roof is one unbroken covering, with no mechanical joints to promote deterioration.

To augment the low-maintenance features of the building, the roof has been constructed of aluminum deck material, one-inch thick cork insulation, a Carey Fire-Chex vapor barrier and standard built-up roofing covered with white chips.

Inspection of the interior of the building, particularly the office areas, shows that the owners and architect were not satisfied with economy and originality in the basic structure alone. The interior finish of the building is unusual in its cost-saving, maintenance-reducing features.

Interior Walls of Brick

Several of the interior permanent walls are of Norman face brick, which needs little or no maintenance. The "difficult" floor areas, such as the washrooms, cafeteria and reception lobby, are covered with easy-to-maintain terrazzo — which, incidentally, is laid over concrete containing double reinforcing mesh.

Hallways in the office area are floored with vinyl tile—one of the maintenance-savers in the design.

Movable partitions in the offices are among the most unusual features of the building. They were constructed by butting pre-finished flush doors together, mounting them in channels for support. The effect is that of expensive paneling, and the walls are readily movable as necessary. Cost of these partitions was $0.50 per sq ft.

On the interior walls that are paneled, costs were cut by purchasing standard 7-ft lengths of paneling, and "piecing" the remaining 21 in. of wall height. This method saved the extra cost of special-length paneling, with a barely noticeable effect on the appearance of the walls when compared with full-length paneling.

Roof drains provided another opportunity to do the unusual in construction. Rather than drop drain lines to the floor, then run horizontal lines in the concrete slab, the entire system is suspended just below the building joists. The system is "dead level", with successively increasing pipe diameters in the system providing the slope necessary for flow of storm water across the building to the downcover.

Unit heaters are mounted in the roof in the manufacturing area, to provide a clear and unobstructed

Fig. 6. Terrazzo floors, melamine-surfaced furniture, copper tile, brick wall surfaces reduce maintenance in reception lobby.

Fig. 7. Stainless steel tile and equipment combine with terrazzo floors in cafeteria to reduce maintenance requirements.

Fig. 8. Aluminum structural channel at top of door-panel supports movable partition, carries communication lines.

Fig. 9. Terrazzo floor and cove base, porcelain wall tile and wall hung fixtures make toilet room cleaning simpler.

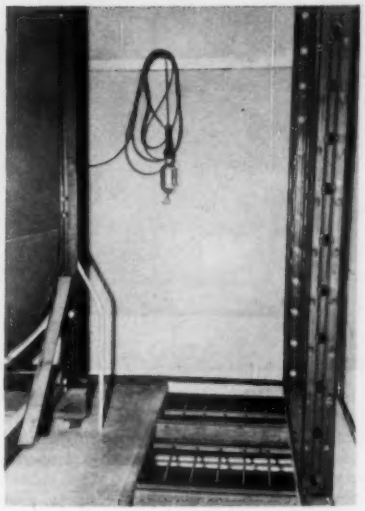


Fig. 10. Interior view of unit heater "house" shows nailable steel beams; extension light is maintenance helper.

production area. This makes possible modification of the production line layout, including the installation of overhead conveying systems as required, without costly alteration to existing facilities. Flow of heated air is through directional louvers, extending down from heaters, below roof beam level.

Air in the entire office area, with the exception of the cafeteria kitchen, is conditioned for summer and winter seasons. Installation costs were reduced by running ducts through the air-conditioned space above the suspended ceiling. Where possible, round prefabricated duct was used, with resultant savings in fabrication and installation time.

Air Ducts in Walls

Return air ducts are an integral part of the outside walls in many cases, with tile flue liners inside the brick pillars between the floor-to-ceiling windows. Insulating glass in all office windows reduces heat transmission, thus conserving operational costs—heating in winter, cooling in summer.

Other features of the plant, listed in the box, all contribute to the savings—either in construction cost or maintenance cost—that are designed into the structure. Motorola, Quincy is an excellent example of industrial plant construction, and is a credit to the owner and to the architect. **End**

Structural and Architectural Features

Continuous concrete-filled trench foundations (spread at bottom in accordance with loading).
Structural system of continuous beam action.
Swing joints for expansion in lieu of double beams and double columns.
Double nut column anchor bolts for adjustment and alignment.
Expansion joints in masonry walls, on module lines.
Keyed expansion joints in concrete floor at column centers.
Expansion joints in concrete floor around columns.
Double reinforcing mesh in concrete floor under all terrazzo area.

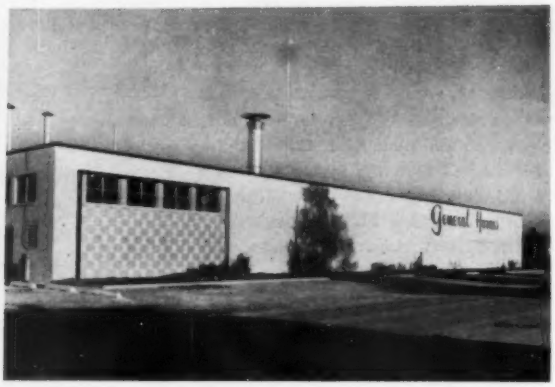
Selection and Proper Use of Material

Exterior and permanent interior office walls, 8- and 12-in. Norman face brick.
Aluminum roof deck.
One-inch cork insulation.
Fire-Chex vapor barrier.
Twenty-year built-up roof.
Glare-reducing, heat-retarding glass in plant windows.
Thermopane glass in office and cafeteria windows.
Prefit doors and metal frames.
Terrazzo floors and cove base in lobby, rest rooms, cafeteria and kitchen.
Porcelain on aluminum and stainless steel tile in rest rooms and kitchen.
Prefinished natural wood paneling in offices.
Movable partitions using standard flush door panels.
Acoustical metal ceilings in offices and cafeteria.
Wall-hung toilet fixtures.
Porcelain toilet partitions.
Wall-hung recessed drinking fountains.

June 16: When fire destroyed the plant of General Homes in Ft. Wayne, Indiana, all production equipment, all inventories were destroyed. The company immediately set out to borrow, rent or buy new and used equipment. As it was received the equipment was reconditioned and stored in a rented circus tent, then set up in a storage building. Production was resumed in temporary building six days later.

August 4: Steel erection for the new plant is now well under way with the boiler room basement and sub-grade loading dock concrete poured. Erection of concrete block walls is beginning. Construction was greatly speeded by use of free-standing frame since construction of roof and installation of sprinklers, dust collection system and lights did not depend on completion of walls to support them.

August 22: Two months plus a few days after the fire the plant has been under roof for several days. This has permitted interior work to proceed without interference from rain. Building is not makeshift in any way but is a permanent masonry and steel structure, completely equipped.

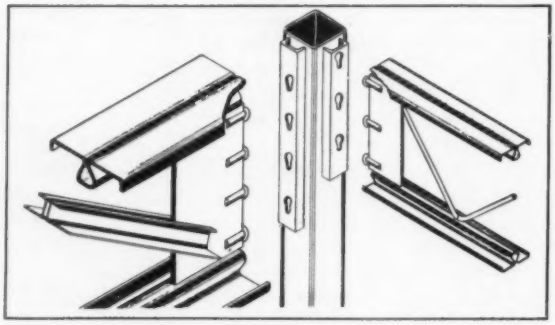


October 3: When this photo was taken on dedication day the plant had been in production for several weeks. The building was completed except for signs, trim and landscaping by August 29. The first home was shipped from the new plant on September 15, three months after fire.

Just 90 Days— FROM BURN-OUT TO PRODUCTION

THE HEADLINE tells the story of General Homes' new plant in Ft. Wayne. On June 16, last year, this company's old plant, its inventory and equipment were totally destroyed. Three months later they were producing again in a new 40,000 sq ft steel and masonry building.

Framework of the new building is assembled from open-web structural steel—girders, beams, columns, fabricated by Macomber. The joining method shown in the accompanying sketch played a hefty part in the speed attained in erecting the building. Another time-saving feature was the fact that the structure was free-standing —the roof supported, not on the sidewalls, but by the vertical columns. Incidentally, no erection sub-contractor was involved in the job. **End**



Details of locking arrangement on steel work that helped speed construction of General Homes' new Ft. Wayne plant.

DON'T LET RUST RUIN YOUR SPARE MAINTENANCE PARTS

Here's How Petroleum Rust Preventives Can Keep Them Operative

By R. F. BALOW and J. R. HICKS, Staff Engineers, Socony Mobil Oil Co., Inc., New York City

WHEN SPARE PARTS are needed for a maintenance job, they are often needed right now. They should not only be quickly available, but should be in a readily usable condition—undamaged, free of rust. When this happens, it is generally the very desirable result of a careful plan for stocking and protecting spare parts.

Although accurate figures are not available, the annual cost to industry of rust and corrosion, including preventive measures, undoubtedly runs into billions of dollars. Even in the restricted category of spare parts, we know of no way to arrive at an acceptable figure for the cost of rusting. Certainly, if a machine must be kept out of production for a lack of a spare part, the cost of lost production might be out of all proportion to the mere cost of the spare part, or even a considerable number of them.

Thousands of spare parts are stocked in many plants, and hundreds of these may be major items such as large gears, plain and anti-friction bearings, rolls for various types of mills, and assemblies such as motors, pumps, and valves. These parts are inventory, and while on the one hand they can be considered as insurance for uninterrupted production, on the other hand they represent idle capital. The proportion of this idle capital to total plant investment varies widely depending on plant type and other factors. We have seen estimates ranging from one per cent in one type of plant to 23 per cent in another. With such percentages, the amount of capital tied up can run into hundreds of thousands of dollars, even millions in a large plant.

Sums like these suggest the possibility of savings, and you may be sure that much management thought has gone into such matters as—

Whether to stock parts or buy them as needed.

How to determine stock limits and who will do it.

Who will control and be responsible for stores.

How to dispose of surplus and obsolescent parts economically.

How to maintain an accurate parts inventory.

The word "accurate" in the last item has a double meaning: not only should the parts be counted correctly, but also the count should represent parts that are actually suitable for use. In the latter meaning, how the parts are preserved in storage is the important factor. This involves protection against both physical damage and rusting. The latter is discussed in this article.

So far, we have been talking mainly from the point of view of the user of spare parts. However, the manufacturer of the parts is just as interested in doing a good job of protecting them as the user. He wants to preserve the parts during storage in his plant and shipment so that when they are inspected upon arrival at the user's plant, they will be received without rejects or complaints. In many cases, the parts will be packaged and protected against rusting in such a way that they can be put in the user's stock without further treatment.

Damage by Rust

Rust is the name given to any of the several products that can result from chemical reactions between iron and oxygen in the presence of water. Rust can be red, brown, black or green depending on the oxidizing conditions. Copper, aluminum, and certain other metals also oxidize, but with these metals a surface layer is formed that protects the metal against further oxidation. Rust on ferrous surfaces, however, is porous so that water and oxygen can still get at the underlying iron or steel. Therefore, rusting continues deeper into the metal.

Rusting destroys surface finish and appearance and may change dimensions to the extent that a part is not usable. Precision parts are often made to tolerances of a few ten-thousandths of an inch, and a very little rusting, even heavy staining, will make them unfit for service. Rusted parts must be scrapped or reworked, and the cost of this—whether to parts manufacturer or the user—can be a heavy burden.

Protecting Maintenance Parts

Fortunately, rusting can be prevented in most cases by various methods including the use of rust preventives.

How To Fight Rust

Rusting of spare parts can be retarded or entirely eliminated by excluding either oxygen or moisture or both from the metal surface. This can be done in one of several ways:

1. By plating with another metal such as zinc, nickel or cadmium.

2. By coating with paint, lacquer or enamel.

3. By placing parts in a dehumidified atmosphere.

4. By applying petroleum rust preventives.

Methods No. 1 and No. 2 are best suited for use where permanent protection is required. Method No. 3 is used mostly for special cases. Method No. 4 is of special value where the protective coating must eventually be removed and is the method considered in this article.

Petroleum Rust Preventives

No single rust preventive would be suitable for every application. The many kinds of spare parts, conditions of storage, and facilities for application require the supplier to make available several types of products. For example, a thick grease-like material may be needed for protecting large, unpackaged spare parts during shipment. But such a product would be too difficult to apply to (or remove from) the interior surfaces of an engine or pump.

As another example, an asphaltic material that forms a black paint-like film may be ideal for long-term storage under severe conditions, but the difficulty of removing such a product might be unnecessarily costly for parts stored for short periods under mild conditions. A number of products should be available. However, a careful study by the supplier's representative can limit to a very few the number of rust preventives required in a particular plant.

Storage Conditions

In selecting rust preventives, the following storage conditions should be considered:

1. Severity of exposure—indoor or outdoor, temperature, humidity.

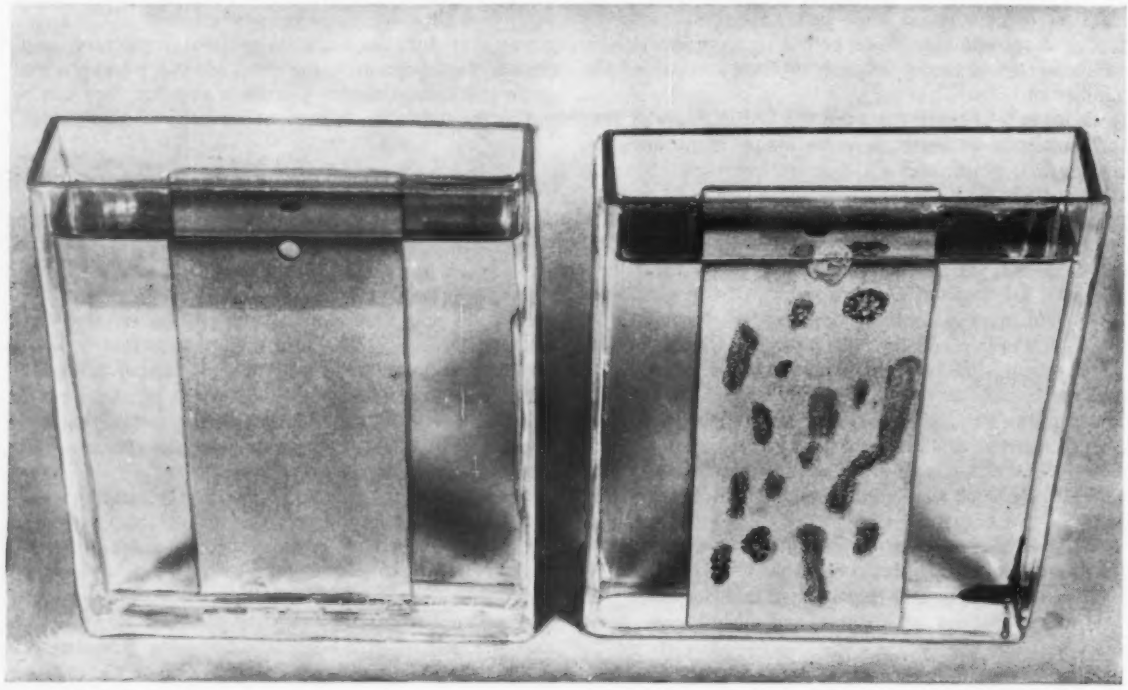
2. How long should the rust-preventive coating last —in manufacturer's plant before shipment; in user's store room?

3. Type of film desired. Should film be thin and transparent, or can it be thick and opaque?

4. Facilities for application—brush, spray, dip.

5. Ease of removal. Sometimes, it may be desirable

Fig. 1. Test plates showing action of moisture-displacing type of rust preventive. A sandblasted plate was dipped in water and transferred immediately to the cell at the left containing the rust preventive. Note how the moisture has been stripped from the metal surface and deposited on the bottom of the cell. The surface remains rust free. The sandblasted plate at the right was also dipped in water but was then transferred to this bath of ordinary mineral oil. Note that moisture has remained on the plate and has caused appreciable rusting at several points on plate.



or necessary to use a product that does not have to be removed.

6. Lubricating value may be important if a spare assembly is operated at any time before installation or if the rust preventive is never removed.

Rust-Preventive Types

Materials most often used for the protection of spare parts fall into one of these categories: 1. Solvent cut-back type. 2. Grease-like oil-petrolatum blends. 3. Lubricating oil-rust preventive blends.

Solvent Cut-Back Type

Solvent cut-backs include a number of products of rather widely different characteristics. One consists of a light petroleum solvent plus a substantial amount of a polar rust preventive. The additive has greater ability to wet metal surfaces than does water, so that it displaces water from the surfaces. The solvent evaporates quickly and leaves a thin, transparent, greasy film. The material is suitable for indoor storage under moderate conditions. It can be applied by any convenient means (brushing, dipping, spraying) and the film can be removed later, if desired, by dipping parts in kerosene.

Moisture Displacement

Another more complex rust preventive of this class is a petroleum solvent-oil blend plus a number of additives that impart highly effective water-displacing ability as shown in Fig. 1. These provide a strong, although thin, oily rust-preventive film. The additives used have a special ability to displace fingerprint moisture and in this way to suppress corrosion and etching that would otherwise occur. This type of rust preventive is used on finely finished parts between machining operations and just before packaging for storage or shipment.

A third solvent cut-back type is quite different from the first two. It consists of an asphalt that is made fluid by means of a solvent. This product can be applied at room temperature by any convenient method. The solvent evaporates and leaves a hard, strong, dry film somewhat similar to paint. Films formed are semi-permanent but can be removed by vigorous rubbing with solvent-soaked rags.

Removal is much more difficult than with the two products previously described. This coating provides long-time protection under severe conditions such as unprotected outdoor storage and presence of corrosive fumes. It is especially suitable for unpainted external surfaces that are accessible for cleaning. The parts should be protected against physical damage since the hard, dry film is not self-repairing.

Some open-gear lubricants are somewhat similar to the rust-preventive type just described and they are sometimes used to protect spare parts. Protective films formed are not as hard but may be described as adhesive and rubbery. The open-gear lubricant usually would be used only if it is already on hand and, by its use, stocking another product could be avoided. However, one open-gear lubricant of this type is available in a small spray "bomb", which is very handy and economical when only a few parts are involved.

Fig. 2. When dismounted bearings have been inspected and found suitable for re-use they may be protected against rusting in storage by the use of a grease that has good rust-preventive properties and storage stability. After solvent cleaning and drying with dry air a coating of grease should be applied and worked into all spaces between the races and rolling elements. Bearings should then be wrapped in a grease-proof paper and in a moisture-resistant paper.

Oil-Petrolatum Blends

Another class of rust preventives, the grease-like products, consists of blends of heavy oils and petrolatums and, sometimes, other materials. These coatings can be brushed on or, when heated, applied by dipping. The film is heavy, tacky, and non-drying. It is semi-transparent to opaque and can be removed by moderate rubbing with solvent-soaked cloth. Rust preventives of this class are suitable for heavy-duty service including unprotected outdoor storage. Some rough handling can be tolerated since the soft protective film tends to be self-healing.

One manufacturer uses this type of product as a slushing compound to protect engine parts that are dismantled for shipment—bearings, crankpins, valve levers, etc. Some of these parts have small holes or drilled passages that would be plugged if a heavy dry-film rust preventive were used.

Certain regular greases used for the lubrication of such parts as ball or roller bearings have excellent rust-preventive properties. Parts may be packed with one of these greases, Fig. 2, and packaged for storage or shipment with assurance that they will be well protected from rusting. This method is widely used by manufacturers of sealed, "packed-for-life" ball bearings.

Protecting Maintenance Parts

Lube Oil Rust Preventives

A third class of rust preventives, lubricating oil-rust preventive blends, is designed for the protection of internal parts of assemblies such as engines, compressors, pumps, gear sets, machine-tool spindles, and air tools. A product of this class consists of a high-quality lubricating oil and substantial amounts of two or more rust preventives. It is applied by running it in the machine in place of ordinary lubricating oil.

These rust preventives work by displacing water from metal surfaces and forming strong water-resistant films on the surfaces, and by soaking up water in the system into a water-in-oil emulsion. Following application, the material should be drained, cleaned up by filtering, and stored for further use.

Another use of products of this class is in the seasonal lay-up of machines. In the case of an engine, the proper viscosity grade of the rust preventive is installed as the last crankcase charge before shutdown. If a mechanical force-feed lubricator is used, the rust preventive should be installed in it too.

Surface Preparation

Spare parts should be clean before application of rust preventives. They should also be dry unless the rust preventive has water-displacing properties. The cleaning method to use depends on the contaminant to be removed, the metal involved, its finish (whether rough or highly polished), and on facilities available.

Common surface contaminants include cutting fluids, lubricants, dirt, polishing rouge, soldering flux, rust or other oxide films, alkali from cleaning solutions, and acids from pickling baths.

Mechanical cleaning methods such as sand or shot blasting, scraping, wire brushing, or tumbling may be useful with some spare parts to remove rust, scale, paint or dirt. However, these methods cannot usually be used with machined parts unless the finished surfaces can be protected from further damage by the sand blasting, etc.

Oil and grease, metal-working fluids, buffing compounds, dirt, etc., are commonly removed by means of vapor degreasing, petroleum solvents, emulsifiable-solvent cleaning, or alkaline cleaning. These methods are all well known and it is not necessary to describe them in detail.

Vapor degreasing does no harm to finely finished surfaces and can be used for metals such as zinc and aluminum that are attacked by some chemical cleaners. Parts come out hot so that they dry quickly.

With petroleum "safety" solvents, usually at least two and often three baths are used in sequence. Small parts are dipped. Large parts are cleaned with solvent-soaked rags. If the rust preventive is to be applied immediately, the parts should be dried by wiping or by blowing with dry air. Using petroleum solvents is simple and does not require expensive equipment.

Emulsifiable cleaners can be washed off with water. They are particularly useful for removing thick oily contamination when hot water at 150 to 175 F can be used. The cleaners are only slightly alkaline and will not harm machined surfaces or sensitive metals such as zinc or aluminum. Parts should be dried as quickly as possible and the rust preventive applied so that rusting will not occur.

Alkaline cleaning and alkaline electro-cleaning are very effective for removing oily contamination, dirt, etc. However, parts should be carefully rinsed. For example, if the rinse water is too alkaline, staining of certain metals will occur and a powdery deposit will remain. If the rinse water is not alkaline enough, ferrous parts tend to rust while drying.

Whenever water is used in cleaning parts, the parts should be dried promptly—in ventilated ovens, by wiping with dry cloths, or by blowing with dry air. The rust preventive should be applied promptly also. Otherwise, moisture from the air will condense on the parts as they cool, and the thoroughly clean metal will rust rapidly.

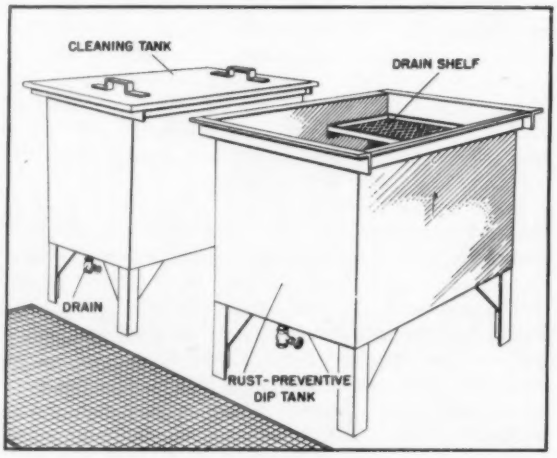
Methods of Application

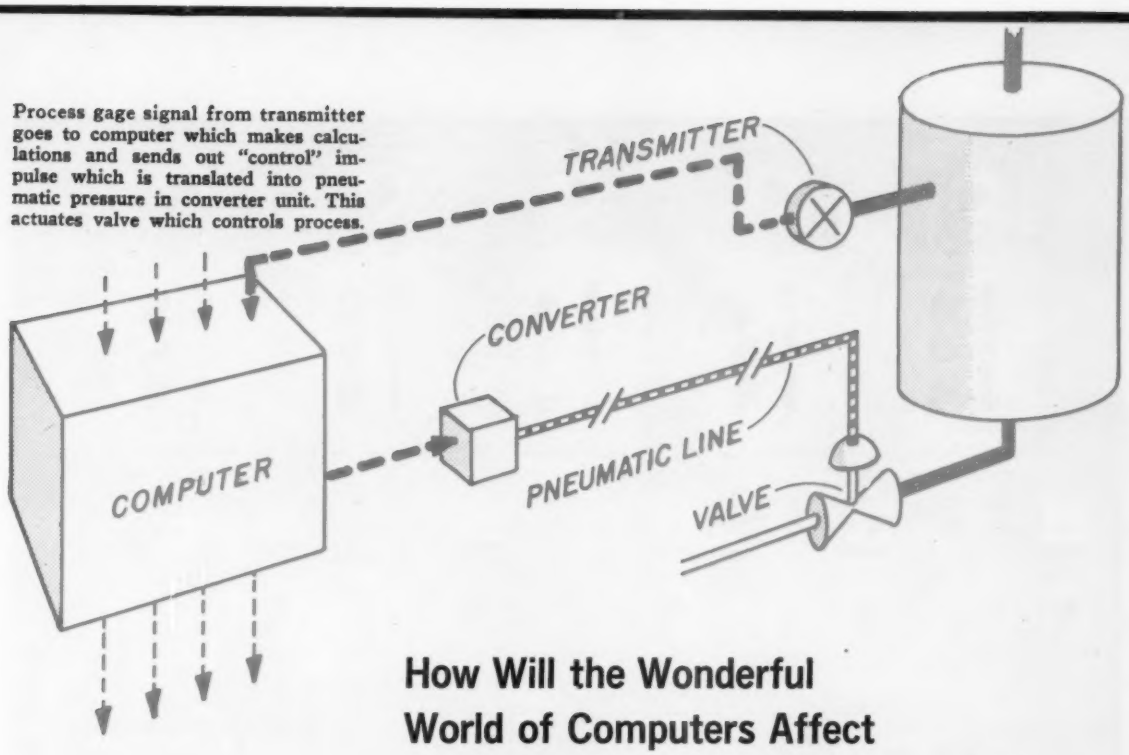
Following are common methods of application for rust preventives: 1. Brushing or swabbing; 2. Dipping (see Fig. 3); 3. Spray; and 4. Circulation.

These have been discussed to some extent already. Circulation refers to the application of lubricating oil-rust preventive blends by running them in engines, compressors, etc., in place of regular lubricating oil.

The mark of an efficient stores department is to have on hand the number of spare parts that the inventory says should be there and to see that the parts are in readily usable condition. The pay-off is particularly noted when a part is needed for an emergency repair job at, let's say, 2 o'clock on Monday morning. The program for protecting spare parts deserves analysis in each plant to make sure that the right rust preventives are used and that they are effectively applied. **End**

Fig. 3. Cleaning and dipping tanks of any convenient size, suitable for cleaning solutions and petroleum rust preventives, can be constructed of steel plate and structural shapes. Drain shelves should be incorporated to prevent unnecessary carry-out of material from tank. Tank covers should be provided to avoid contamination by foreign matter when the tanks are temporarily idle. Drains at the bottom of each tank permit removal of fluid and residue.




Process gage signal from transmitter goes to computer which makes calculations and sends out "control" impulse which is translated into pneumatic pressure in converter unit. This actuates valve which controls process.
TRANSMITTER
CONVERTER
COMPUTER
PNEUMATIC LINE
VALVE

How Will the Wonderful World of Computers Affect Plant Engineering and Maintenance . . .

. . . WHEN AND IF COMPUTERS RUN YOUR PLANT?

THE HANDWRITING'S plain on many a plant wall: sooner than you think, transistor-brained robots will be running many plants and many processes.

And the "sooner" is underscored if the plant is a continuous flow process: petroleum, chemical, utility, food processing or paper making.

How will robot operation affect maintenance . . . affect you and your job?

Says a plant manager, "In the making is a new and dynamic plant operational team: the robot and the plant engineer."

An unlikely combine? Not as unlikely as it may seem. For with computers operating plant processes, maintenance will emerge the single most important cog in production.

Reasons a robot designer, "Computer-controlled, a plant's going to need better and more careful maintenance. It'll mean an upgrading for the plant engineer . . . a new pinnacle of importance for the process maintainer . . ."

All plant engineers, however, aren't applauding the prospects of teaming up with tubes and transistors. Grumbles a plant engineer in Texas, "I'll take orders from computers if I have to . . . but I'm not going to like it."

But at Hughes Aircraft Co., in Los Angeles, where the nation's first all-electronically controlled machine tool line has been operative more than a year, a maintenance foreman is pleased as punch.

"That robot," he says, gesturing toward a giant console, "is the best trouble-shooter on our payroll. Why, it diagnoses its own ailments . . . tells you what's wrong and practically how to work a cure."

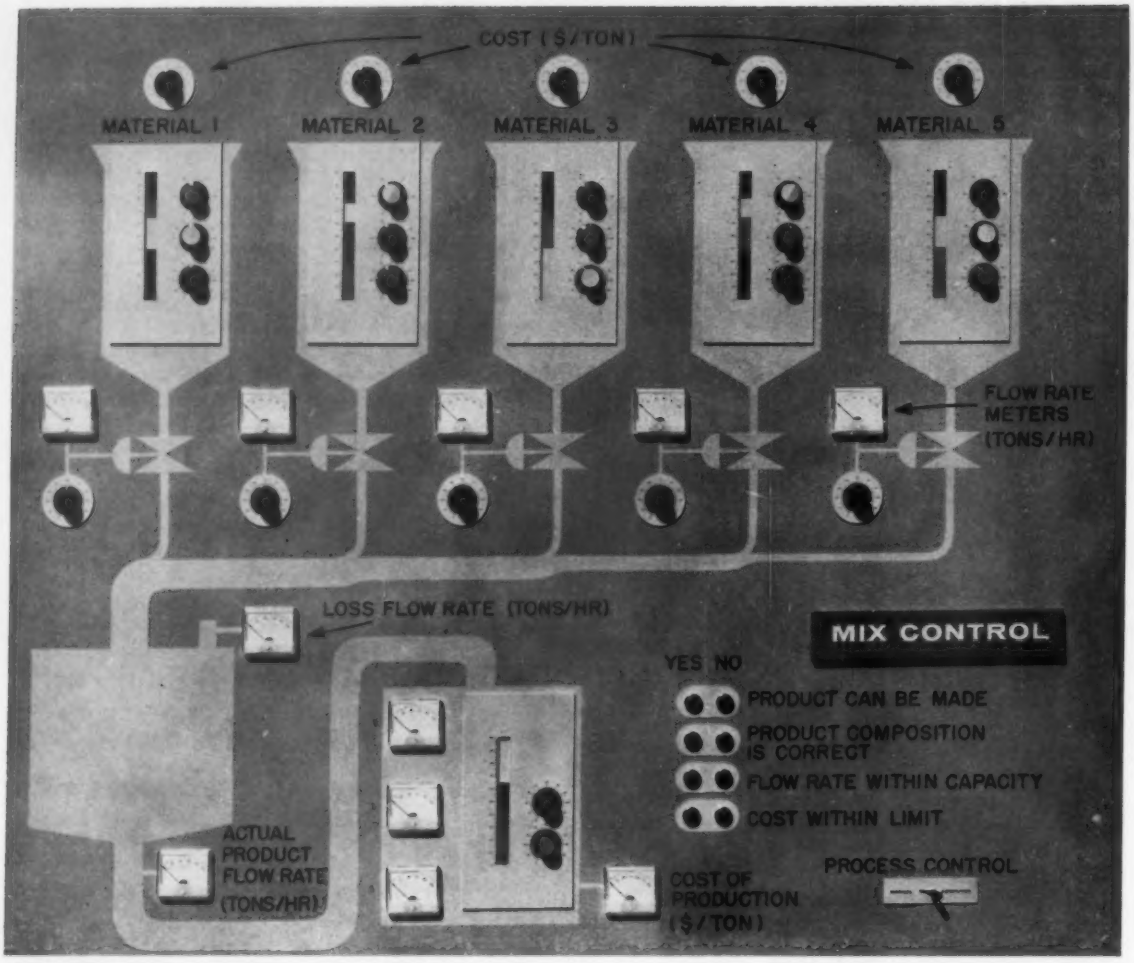
A difference of opinion? There is. There's also a difference not only in robots but in the scope of their control over plant operations.

The Hughes tape-brained computer, for example, bosses a single, though highly versatile and complex, production line.

Far more formidable—and more all-encompassing—are the so-called "control" computers designed to operate an entire plant or process.

Unlike the more usual digital-analog computers whose end product is data, the control computer's end products are control signals . . . electrical impulses which actuate valves . . . which control the process. Simultaneously, of course, the control computer prints a log of its operations. But its prime job is running the process . . .

Explains a computer engineer, "In the computer-controlled process, the various process measurements are supplied to the computer through amplifiers and converters. Calculations and decisions leading to selection of the optimum set points are made by the computer, and the decisions—in the form of electrical impulses—are transmitted back to the process. The operator



This diagram shows control computer's remarkable ability to control mixtures within a process to come out with precisely the right—and most economic—throughput. Gages are actuated by computer to produce mix at pre-set flow rate.

and plant engineer will receive information about the process *from* the computer and can modify the operation of the computer . . . or in emergencies, exercise control by scanning recorders and manually changing the set points of the controllers."

At Port Arthur, Texas, The Texas Company is putting a control robot to work operating a polymerization unit. Taking over from human operators (though not supplanting them), the computer will analyze flows, temperatures and chemical mixtures. Quick as a flash, it'll actuate valves to control the entire process.

Operational by mid-summer will be Riverside Cement Co.'s computer-controlled batching-blending plant at Oro Grande, Calif. The robot will keep track of the amount, chemical composition and point-of-origin of thousands of tons of rock and other raw materials. Methodically, it'll calculate how much and what kinds of materials should be batched . . . for a chemically-correct cement mix.

At B. F. Goodrich Chemical Co.'s Calvert City, Kentucky, vinyl chloride monomer plant, a robot—just now being installed—will run the entire productive process—and even print an operational log detailing exactly what decisions and actions it took.

Only in February, MIT announced its APT (for Automatically Programmed Tool) system . . . which for the first time allows the plant engineer (and the tool engineer) to instruct a robot. Previously, robots understood only the language of mathematics. And it required a highly skilled mathematician to instruct them. Now, thru APT, *you* can tell a computer in abbreviated English (some 100 "words") what you want it to do. The APT computer, "understands" this English, and then automatically translates *your* words into complex math . . . the only language the operating computer savvies. Thus instructed by what amounts to a *robot interpreter*, the *operating robot* goes about its assigned job.

Suppose, via punched tape (which any secretary can type) you told the computer, "ON KUL, ON SPN, GO RGT, TL LEFT, CIRCLE/-CTR +2."

Translated, your instruction read, "Turn on the coolant, turn on the spindle, go right with the tool on the left side along the circle whose center is located at x equals 2."

But you might as easily have told the translating computer, "Shutdown the process if gage No. 6 reads 70 F, plus-minimum ½-degree."

And the control computer would do just that . . . shut down the process if operational minimums varied from pre-set standards. But control computers, right now going into some dozen U.S. plants, do much more: they actually analyze the process under control, make all valve and flow changes to assure the prescribed end product, whether a high-octane mix of gasoline or a batch of cement.

In brief: control computers may, sooner than you think, be running your own plant.

How does a control robot do it? Well, in a matter of micro-seconds (a couple millionths of a second), it compares scores of meter readings with a pre-set "operational optimum" programmed into its memory device. Just as speedily, it triggers electrical impulses which, usually pneumatically, adjust the system's feeds, ingredients, temperatures and pressures . . . assuring a controlled output.

Simultaneously, the robot types a report, advising plant operators and maintenance engineers what changes it has made. And, if trouble's brewing anywhere in the complex production loop, the computer sounds an alarm . . . may even type out a memo to plant engineering, pinpointing the fault.

Often, too, the robot can predict trouble . . . anticipating a maintenance problem before it develops.

The crucial question: will the robots become plantdom's canniest trouble-shooters . . . an invaluable aid to plant maintenance? Or will they relegate the maintenance staff to subservience . . . to taking orders from robots?

"It depends," reasons one robot designer, "what you mean by 'taking orders'. If you mean that the robot will point out malfunctions even before they become bothersome, thus alerting maintenance, I suppose you could say that the robots 'give orders.' "

"But," he adds, "what you're really saying, aren't you, is that computers become just another tool of maintenance. They may pinpoint trouble, but they can't fix it."

B. F. Goodrich Chemical Company's president, John R. Hoover, apparently sees his company's computer installation as presaging better—and more analytical—maintenance.

"By providing a degree of process control not otherwise attainable," he said recently, "the new computer will maximize the efficiency of the production unit."

"Computer control," says a robot engineer, "will take all the guesswork out of maintenance."

As one example, he cites a current maintenance problem: the decline of catalytic effectiveness in some continuous feed processes. Periodically, the catalyst needs replacement or rejuvenation. And there's an optimum—a "just right" —moment for such action. The problem until now has been to pinpoint that precise moment. The pinpointing is all but beyond human capability. But for the computer, which in seconds can evaluate hundreds of gage readings, the job is simple.

"These 'optimum decisions', easy for a computer," points out one plant man, "should take the guesswork out of maintenance. The computer unburdens the plant engineer from hairline decisions. In the unburdening, the computer doesn't order anybody to do anything. It merely says, in effect: 'This valve is no longer as efficient as it was' . . . or 'This chemical, pipe or tank needs attention of maintenance.' "

Computers will also case-history trouble, putting in the maintenance's hands a complete, second-by-second chronology of what went wrong . . . and why.

Monsanto Chemical Co., for example, announced only last December that it'll put a control computer "on the line" in one of its plants.

Monsanto's Howard K. Nason, vice president and general manager of research and engineering, said the computer will continually monitor the process, make lightning-fast calculations and automatically adjust controls for optimum output.

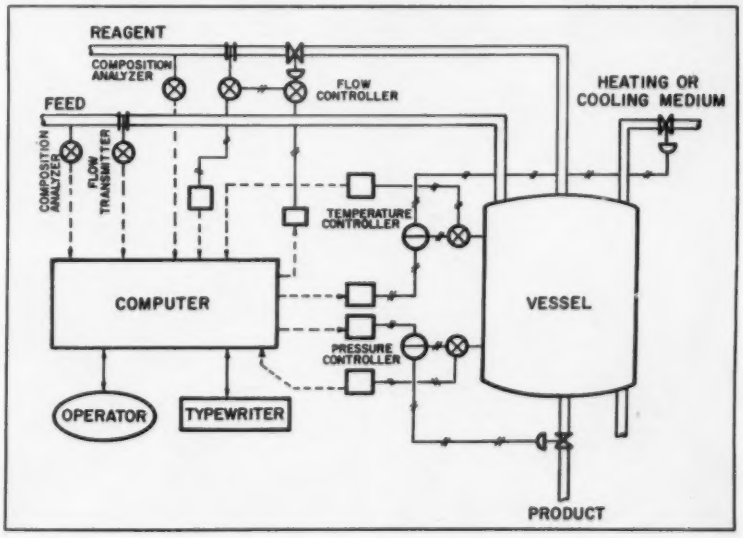
Will control computers mean more—or less—work for maintenance? Likely they'll mean more work. And here's why: with computers running a process, the process will be analyzed during every second's operation . . . and trouble spotted in its initial stages. Where, by less automated control, faults often don't turn up until they become emergencies, computers will spot trouble . . . and, in effect, ask maintenance to repair even the most minor of process troubles.

Says one plant manager, "We expect to reduce our operational force and enlarge our maintenance department."

Reasons another, "But a *bigger* maintenance staff isn't the whole answer. We expect to add to maintenance a team of key men who'll

(Continued on page 226)

This is a complex hypothetical control. The diagram shows how a computer not only controls a process but also types out an operational log of decisions.



BOLTING CAN MAKE STRUCTURES BETTER

How High-Strength Bolts "Beef-Up" Steel Work

IN A STEEL plant no building takes more punishment than one in which its structural steel members and their connections are subjected to the brutal combination of side and lateral stresses, resulting from heavy tonnage bridge cranes and trolleys starting, stopping and moving as they meet the demands of soaking pits, open hearths, and other continuous operations of the hot metal departments.

Maintenance of such structures and their "beefing up" to keep pace with heavier and heavier loads and production speed-up has given many a plant engineer gray hair. Overstressing of connections beyond their design limit is perhaps the most serious aspect of the problem, since rivets often loosen and must be replaced.

For a solution to this problem, Bethlehem Steel Company at its Bethlehem, Pa. plant, turned to high-strength bolts. Research has shown that a high-strength bolt of the same diameter as the rivet it replaces, properly tightened and under the same conditions of shear and stress, has about half again as much holding power as the rivet. Connections in which high-strength bolts are substituted for rivets increase in structural strength in direct proportion to the number of bolts used in substitution.

Today, at Bethlehem Steel, all connections in the structural members of buildings and equipment which are subject to rehabilitation are high-strength bolted. The results have been most gratifying.

Here, one workman burns off heads of loosened rivets while his companion uses air hammer to drive rivets from holes. An entirely new connection will be fitted.

In March, 1953, it became necessary to strengthen the steel framing where two 10-ton capacity bridge cranes were in continuous operation. This building dates from 1912. It is 321 ft long and 74 ft wide, with 13 bays. Fourteen columns support the crane runways and roof truss structure on each side, making 28 connections to be frequently checked and renewed.

In 1916 all riveted connections were re-worked and other work done to reinforce the structure. During the ensuing years replacement of rivets and the addition of reinforcing steel was frequent. Originally built with brick curtain walls, it was found necessary to remove the brick and encase the building with corrugated sheet steel siding.

In the spring of '53, it was apparent some work must be done on the steel if it was to withstand the gruelling strain of fast-paced production. New diaphragms were installed at the column head connections using ⅞-in.high-strength bolts. Nuts were tightened to Bethlehem Steel bolting manual specifications, using calibrated pneumatic torque wrenches.

In 1956 two new bridge cranes,

THAN NEW

built by Bethlehem and assembled with high-strength bolts, were put into service. Each of these cranes weigh approximately 150 tons, including the 75-ton bridge trolley. Their span is 65 ft. A combination of severe side and lateral stresses occurs at adjacent column connections each time the crane and trolley start, stop, or are in motion. These stresses are roughly estimated to be about 25 per cent greater than the weight of the crane and its load.

During the five years the high-strength bolts in the column connections have been in service, including those during which the new cranes have operated, the Lehigh soaking pits have seen some of the highest production ever attained. And the cranes serving them have been operated at speeds and under loading conditions no less severe.

The success of this pioneer installation has led the company to use high-strength bolts in many new ways, as in the two cranes installed in the soaking pit building, in crane rail splice bar connections, and in a 200-ton crane in open hearth pit side service.

Bolting-up crew of two men working in close quarters tightens high-strength bolts while rehabilitating structural connection in Bethlehem Steel Company's Open Hearth Building. One man holds spud wrench; second, a torque wrench.

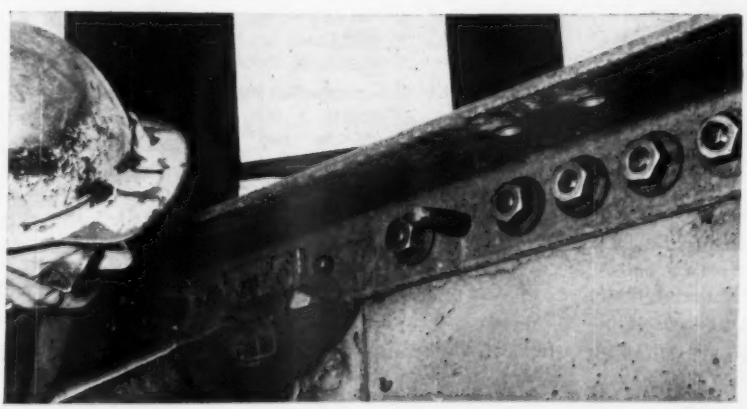
Speed and Strength

A number of advantages in addition to holding power are cited in favor of high-strength bolts for rehabilitation purposes by Bethlehem's Labor and Construction Division. Time saving is extremely important. Speed of installation was cut by about two-thirds the time necessary for riveting, including necessary preparation of the connection area.

Thorough training and supervision is required for bolting-up crews. The calibrated torque wrench is practically error-proof if it is properly checked before the day's work and maintained on the job. The "turn-of-the-nut" method is even simpler to perform. Fewer men are required for bolt installation—two against four for riveting.

The same crew can burn out the rivets, ream the holes, fit up, insert the bolts, and do the tightening, However, usual Bethlehem plant practice uses two crews of two men each. One pair operates ahead of the bolting-up men, burning out rivets, reaming, aligning the connections, and inserting the necessary bolts for fitting-up. The bolting-up crew follows. Even in difficult-to-reach locations the speed of operation far exceeds that of riveting. And the safety factor is much improved, also.

In the rehabilitation of old structures, Bethlehem uses the pneumatic torque wrench on bolts up to and including ⅞-in. Above this diameter, the "turn of the nut" method is followed, using an impact wrench and following the instructions in the high-strength bolting manual. It has been found entirely satisfactory. **End**



Close-up of structural connection where loosened rivets have been burned out and have been replaced by high-strength bolts with much more holding power.

HOW MAINTENANCE STUDIES CAN DECREASE MACHINE DOWNTIME

By EDWARD M. BENJES, Mechanical Superintendent, Lever Brothers Company, Baltimore

SOME THREE YEARS ago I was given an opportunity to investigate the service life of mechanical packing and, at the same time, the service obtained from a pump plunger. The test procedures that were developed, along with the test findings have, I believe, a general value. Furthermore, they can assist in the solution of wear problems in machine parts other than those investigated in this test.

There are several types of wear that can take place. The process of "lapping-in" metal parts is a good example of one type of wear, albeit controlled. Let's assume we are lapping a valve block to a valve seat (the two moving parts) using an abrasive compound in oil as the surrounding medium. Wear takes place through the cutting action of the abrasive, and metal is removed from the two parts by attrition.

If we leave out the abrasive in the oil and rub two soft steel parts together, we will, if the pressure is sufficient, cause another type of wear called galling. Here the metal detaches itself from one part and is welded to the other. In other words, transfer of metal takes place. Still a third type of wear, called spalling, takes place when pieces of the moving parts are lost from the wear surface due to metal failure.

The conditions that will vary these wear rates are many. Corrosion, load, lubricity, rubbing speed, composition of the materials used, temperatures, and contaminants are factors affecting the longevity of machine parts.

Conditions existing in the tests I conducted on the life of mechanical packing were as follows:

Type of Wear	**Attrition**
Corrosivity	**Alkaline, pH 12**
Load	**Medium to high**
Lubricity	**Slight, like water**
Speed	**340 in. per minute**
Materials Tested	**Chrome plated stainless steel plunger. Ceramic plunger. Rubber and fabric packing**
Pumped Liquid	**Detergent and water**
Temperature	**190 F**
Contaminants	**Slight but effective**

All of the data concerned a high pressure (600 psi), horizontal, triplex plunger pump with a stroke of 5 in. and a plunger diameter of 3.500 in. The pump was under positive suction pressure of about 150 psi, and was operated one, two, or three, eight-hour shifts per day depending on requirements. A section through the plunger area (see sketch) shows the design.

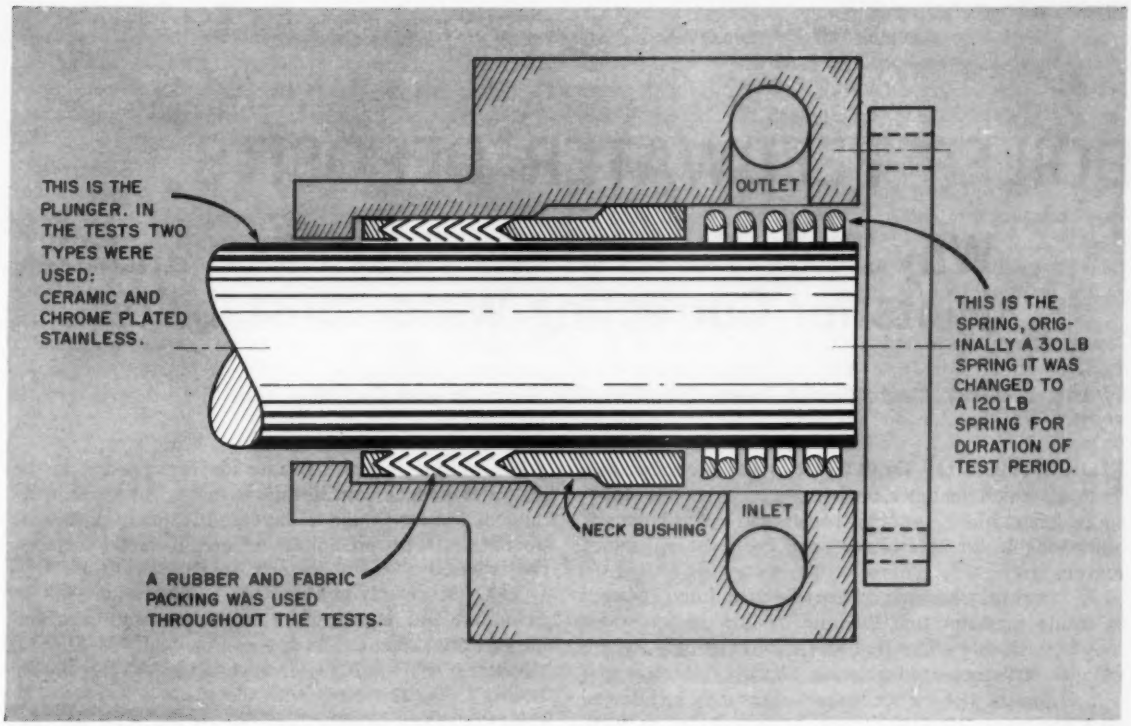
Major reason for undertaking the tests was to reduce costs, and the specific idea was to extend packing life to avoid shutdowns during operations. As there was obviously a close interrelationship between packing and plunger, we were greatly interested in testing two types of plungers. Inasmuch as all the parts to be tested were on one pump, the conditions to which the parts were subjected were nearly the same. This resulted in a highly accurate test. The test was started with the installation of a ceramic plunger. We wanted to compare this with the pump's two remaining plungers that were made of hard, chrome-plated, stainless steel.

Previous experience indicated that a rubber and fabric packing should produce the best service, and the entire test was conducted using packing of this type.

One exception to the above was a test run using packing made of homogeneous nylon. These rings failed in very short order due to no fault of their own. But the poor results sparked an inquiry into plunger design that resulted in an important design change: replacement of a packing spring of 30-lb load with a spring of 112-lb load.

Investigation proved that several factors can affect packing life. One of these factors is the accuracy of manufacture and adjustment of the plunger support that controls the straight line movement of the plunger. (A dial indicator check, in our tests, showed the stroke to be quite accurate.) More wear was noted, however, on the lower part of the plunger, so it is quite probable that a vertical design pump would be preferable to the horizontal design.

The part played by the neck bushing was also examined. The internal clearance is important and should be approximately 0.012 in. total or 0.006 in. on the radius. Close clearance is desirable to effect a pressure drop through the bushing to the packing. This part was replaced from time to time when clearance became excessive—0.030 in.


THIS IS THE PLUNGER. IN THE TESTS TWO TYPES WERE USED: CERAMIC AND CHROME PLATED STAINLESS.
OUTLET
THIS IS THE SPRING, ORIGINALLY A 30 LB SPRING IT WAS CHANGED TO A 120 LB SPRING FOR DURATION OF TEST PERIOD.
INLET
NECK BUSHING
A RUBBER AND FABRIC PACKING WAS USED THROUGHOUT THE TESTS.

This is the stuffing box arrangement on the pump used in author's maintenance studies. 120-lb spring proved best.

Examination of the plungers showed not only a loss of diameter when measured with a micrometer but, in addition, the surface was scored or grooved along the length of the plunger.

Examination of the packing showed wear on the outside diameter—an improper condition. This meant that the packing was moving with the plungers instead of remaining stationary. This observation led to the application of the heavy duty springs previously mentioned. The best solution to this problem would be the elimination of the spring design and this has been done on newer pumps designed by the manufacturer.

Improved results obtained by use of the heavy duty spring can be demonstrated by comparing the number of operating shifts that the pump could run between repacks. It will be noted from the following figures that repackings were much more frequent before installing the heavy duty spring than they were following its installation.

Before Installation of 120-lb Spring

Ceramic Plunger—835 shifts with 37 packings or 23.9 shifts per packing.

Chrome Plunger—885 shifts with 20 packings or 44.3 shifts per packing.

After Installation of 120-lb Spring

Ceramic Plunger—488 shifts with 12 packings or 40.6 shifts per packing.

Chrome Plunger—488 shifts with 8 packings or 61 shifts per packing.

Note that the service life of the packing used with the ceramic plunger was just about doubled after the heavy spring was installed. The difference in life of packing used with the chrome plunger was not so marked. However, the ratio of packing changes went from 2 to 1 in favor of the chrome over the ceramic (before the heavy spring) to a 3 to 2 ratio following installation of the heavy spring.

Upon completion of the tests we made the following calculations in order to determine our cost picture after installation of the heavy spring. Total cost of repacking each plunger was based on a $3.00 cost of materials for each repack and $2.00 labor charges, or a total cost of $5.00 for each repack. The ceramic and chrome plungers are nearly the same price and will be listed in the following table at $135.00 each.

	Ceramic	Chrome
Number of plungers used	1	5
Cost per plunger	$135.00	$135.00
Cost of plungers, total	135.00	675.00
Cost of plungers per location	135.00	675 = $337.50
Cost of plungers per 488 shifts	48.00	120.00
Cost of packing per 488 shifts	60.00	40.00
Total cost per 488 shifts	108.00	160.00

Application of the ceramic plunger and the use of the heavy duty spring are two good examples of design maintenance. Both items are of minor cost, but the better performance of these two small items has upgraded the performance of the entire unit by increasing process reliability. **End**

BOILER FEEDWATER DEPOSITS

Why They Form in the First Place and Hints for Correcting Water "Instability"

By J. S. BEECHER, Chief Chemist, Power Chemicals Div., E. F. Drew & Co., New York City

FORMATION OF DEPOSITS in the preboiler section, which includes such equipment as the feedwater heater, lines, pumps, valves and economizer, is objectionable for several reasons. The most important reasons are:

1. Lines may become so heavily coated and reduced in inside diameter that the rate of flow of feedwater may be seriously affected. There have been cases where outages have occurred because of this.

2. Efficiency of the feedwater heater may be affected with the result that the dissolved oxygen in the feedwater will not be reduced to a sufficiently low level. This will result in an increase in the consumption of a sulfite salt if one is used. If none is used, it may result in a corrosion problem in the steam generating system.

3. Efficiency of the feedwater pump may be considerably reduced because of a reduction in pumping capacity. Such a condition may result in outages for maintenance.

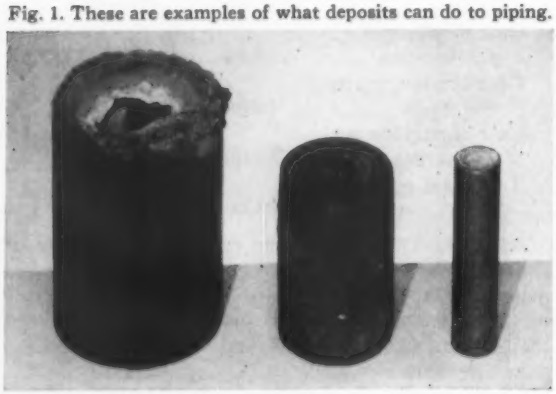
4. If an economizer is employed, it may become heavily coated on the water side and restrict the flow of feedwater to an objectionable degree and eventually result in outages for cleaning.

5. Valves may become so heavily coated that they will not function properly.

6. Maintenance may become quite time consuming and costly.

Preboiler section deposits form for one or more of several reasons. The most important reasons are:

Fig. 1. These are examples of what deposits can do to piping.



1. Calcium and bicarbonate ions are present in the feedwater in such concentrations that when the temperature of the feedwater is increased, calcium carbonate precipitates. This precipitate adheres to metal surfaces. The reaction is: $Ca^{++} + 2HCO_3 \xrightarrow{heat} CaCO_3 + CO_2 + H_2O$. It also is possible for a magnesium salt to precipitate and deposit when magnesium and bicarbonate ions are present. The reaction is: $Mg^{++} + 2HCO_3 \xrightarrow{heat} MG(OH)_2 + 2CO_2$. In high silica makeup waters, the $Mg(OH)_2$ may react with the silica.

2. Phosphate treatment is fed to the preboiler section. When phosphate is fed to the preboiler section, calcium and magnesium ions in the feedwater react with the phosphate to form only slightly soluble calcium and magnesium phosphates which precipitate out of solution and adhere to metal surfaces.

3. Alkali, especially sodium carbonate, if fed to the preboiler section in excessive amounts causes a reaction to occur between calcium and magnesium ions in the feedwater and the alkali to form calcium carbonate and magnesium hydroxide or magnesium hydroxide silicate precipitates which adhere to metal surfaces.

4. If the makeup water contains soluble iron (usually present in well waters) the iron in the feedwater, under the influence of heat precipitates out of solution. The presence of dissolved oxygen greatly aggravates the reaction. The iron first precipitates out as iron hydroxide which eventually is converted to hydrated iron oxides. These precipitates adhere to metal surfaces.

5. Many well makeup waters contain Crenothrix, frequently referred to as iron bacteria. These microorganisms require iron and possibly organic matter for life and therefore soluble iron is generally present in the water when they are present. The organisms which contain iron, adhere to metal surfaces.

6. Returned condensate contains contamination which reacts with constituents in the feedwater to form adherent deposits, or the contamination may itself form deposits on metal surfaces.

7. An infrequent cause of preboiler section deposits is contamination of the makeup water with soluble or insoluble matter. Such matter (industrial wastes, suspended material, etc.) reacts with constituents in the feedwater forming deposits on metal surfaces or the matter itself becomes deposited.

The tendency of a water to deposit calcium carbonate can be determined by calculating Langelier's Saturation

pH Value which is the value at which the water would be saturated with calcium carbonate, and then determining Langelier's Saturation Index which is the difference between the actual pH value and the calculated pH value. If the calculated saturation pH value is higher than the actual pH value, the tendency of the water is to be corrosive. If the calculated saturation pH value is lower than the actual pH value, the tendency of the water is to be deposit forming.

The difference between the actual pH value and the calculated saturation pH value is termed the index. A positive index indicates a water that has a tendency to deposit calcium carbonate. A negative index indicates a water that does not have a tendency to deposit calcium carbonate but rather has a tendency to dissolve it and therefore has a tendency to be a corrosive water.

Saturation pH Value Factors

Saturation pH value is determined by studying the relationship between the calcium ions, bicarbonate ions (alkalinity), dissolved solids and temperature of the water involved.

Before a preboiler section deposit problem can be corrected, the cause or causes must be known. A study of analyses of pertinent water samples and the method of chemically treating the water, steam and condensate in the steam generating system is needed.

Furthermore, the type of equipment employed may have a bearing on the problem. For example, a tray type feedwater heater is more vulnerable to deposit formation than a jet or spray type. Generally, one or more of the means given are required in correcting a preboiler section deposit problem.

If the makeup water contains calcium, magnesium and bicarbonate ions in such quantities that the water is "unstable", the corrective measures that can be taken are as follows:

1. Continuously add a "stabilizing" chemical to the water. Lignin organics possess stabilizing properties. This measure is usually followed before the employment of primary treating equipment is considered.

2. Remove the objectionable impurities with primary (external) treating equipment such as hot lime zeolite, combination cation exchange system operating on the sodium and hydrogen cycles, zeolite softening, etc.

3. If phosphate treatment is fed to the preboiler section (especially continuously) and phosphate deposits have formed, install feeding equipment (tank, pumps and auxiliary equipment) to feed the treatment continuously and directly to the boilers.

4. If it has been determined that the makeup water involved was not "unstable" but that the addition of alkali to the water caused it to be unstable, feed part or all of the alkali (as required so that the water is not unstable) continuously and directly to the boilers, the alkali may be fed with the phosphate.

5. If an objectionable amount of soluble iron is present in the makeup water and precipitates out and deposits in the preboiler section, the soluble iron should be removed with primary treating equipment such as aeration and filtration. More elaborate equipment should be used if it is considered desirable to remove other objectionable impurities besides soluble iron. For example, if the amounts of calcium, magnesium and bicarbonate ions present are objectionably high, a hot lime-zeolite system may be desirable for removing calcium, magnesium, bicarbonate and iron.

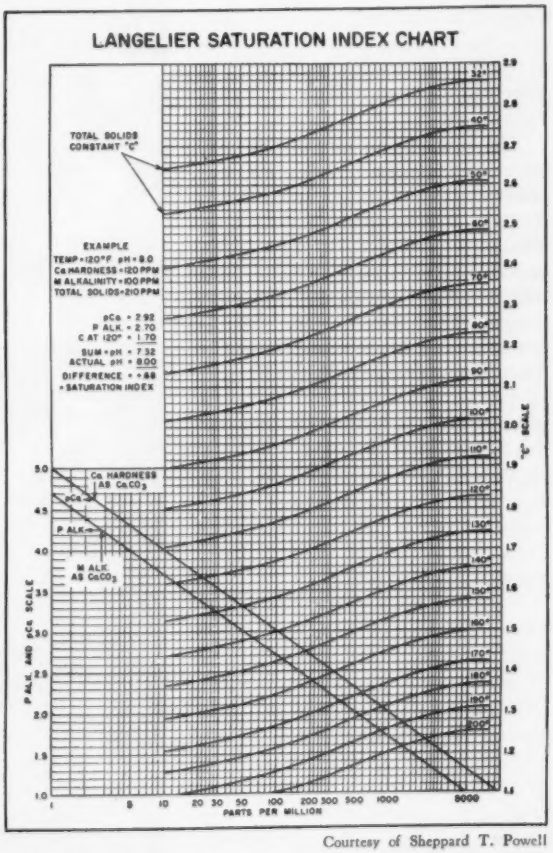
6. If "iron bacteria" are responsible for a preboiler section deposit problem, a primary treating system consisting of aeration, chlorination and filtration should be considered for removal of soluble iron and the "iron bacteria".

7. If the returned condensate is contaminated, an investigation should be made to locate and eliminate the source or sources of contamination.

8. If the makeup water is contaminated with industrial wastes, suspended matter or other contamination such as oily matter, primary treating equipment should be employed to remove the objectionable impurities or consideration should be given to another source of makeup water.

As previously mentioned, one or more of the corrective measures discussed may be required to correct a preboiler section problem. If the exact cause is known, perhaps only one simple measure such as changing the location of feeding phosphate may correct the problem.

On the other hand, elaborate primary treating equipment such as hot lime zeolite may be required to take care of the problem. **End**



Courtesy of Sheppard T. Powell

Fig. 2. If the saturation index is positive, the feedwater is deposit forming. Negative index signifies water is corrosive.

OVEN SPACE PROBLEM SOLVED

Result: A Successful "Shoe Horned" Setup

By F. R. BAX, Supervisor, Advance Manufacturing Engineering,
Appliance Motor Dept., General Electric Co., DeKalb, Illinois

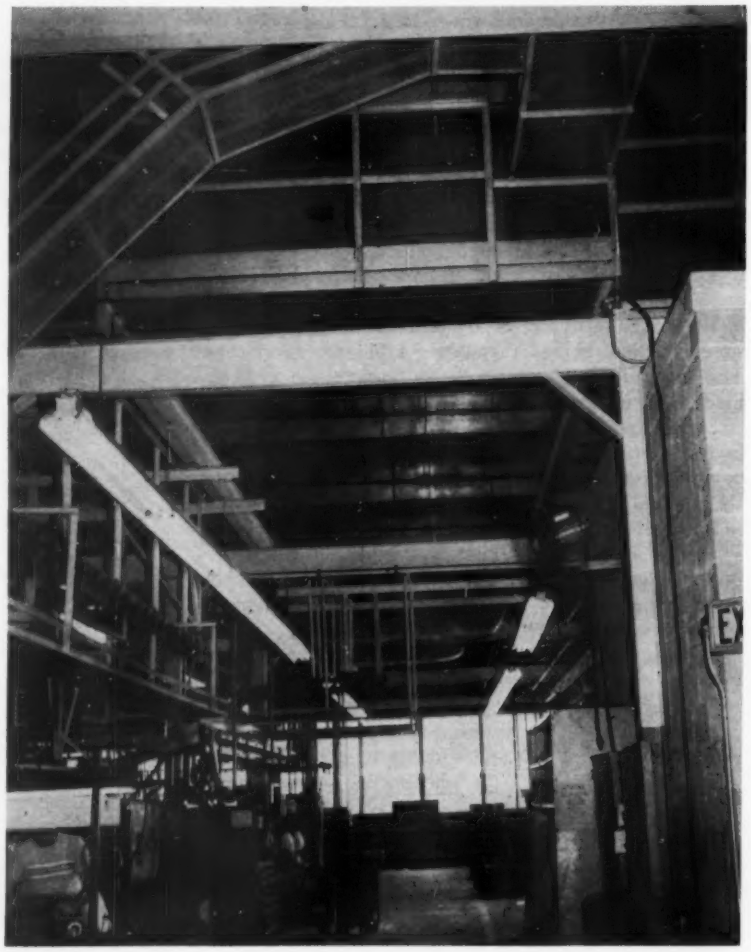
SOME YEARS ago the Appliance Motor Department of the General Electric Company, which has its main operation at DeKalb, Illinois, undertook a large expansion and a completely different manufacturing setup. One of the main processes to be planned and put in place was a varnish painting and bonding operation for motor stators and their housings. A commercially available bonding paint, mixed with a toluol thinner for proper viscosity was the material to be used. Prior to the dip and final bake cycle a prebake was necessary to cure applied varnish on the winding end turns.

The existing operation at that time used separate ovens for prebake and final bake. These ovens were of the infrared heating type. The final bake oven had also a convection type curing tower. Both ovens were mounted on the plant floor and had fixed loading and unloading operator stations for each. Since one of the major objectives of the over-all program was a substantial increase of production output (up to 100 per cent more) for approximately the same manufacturing area, it became obvious that a large cumbersome floor-mounted oven would require a prohibitive amount of floor space.

Experience had shown that equipment rearrangement in subsequent years required a maximum freedom of factory area utilization, without being hampered by fixed work locations. A conveyorized loading and unloading operation of the total system, using simple, easily rerouted conveyors, was desired.

One problem in the pre-planning stage became apparent. The new building, which was designed and built for optimum structural cost, allowed only a minimum extra weight to be suspended from its roof trusses. Also, the roof truss structural design and the available space between bottom truss cords and roof would require a custom designed oven. One bay, close to the contemplated loading and unloading point, was of the open type and had a minimum of braces and other obstructions between roof spans. In this bay, workers' rest areas, small parts bin storage, and a major access aisle were planned. See Fig. 1. The overhead space

Fig. 1. Oven was custom built in space having minimum trusswork interference.



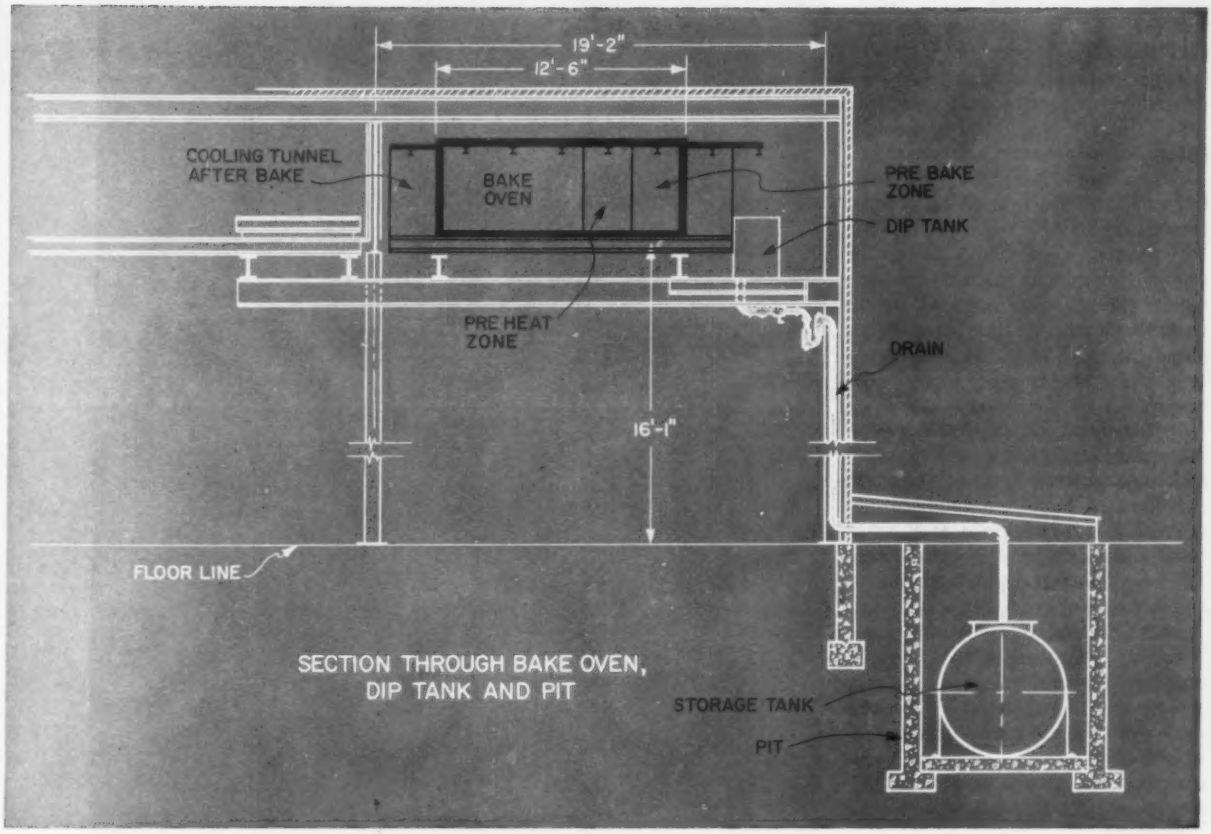


Fig. 2. Cross section shows oven compartments; provision has been made to dump paint into tank in case of emergency.

could therefore be utilized to optimum advantage without interference with any other equipment.

Subsequent process and laboratory trials with the varnish material showed that a gradual temperature rise was necessary to drive out solvents and prevent bubbling of the spaces. These results indicated that a convection-type process would be desirable since radiant heat might cause external curing prior to internal bonding of the stator. Complete process and equipment specifications were drawn up and several companies active in the field of commercial heating and oven equipment were invited to submit preliminary plans and quotations.

Selected was a plan proposed by a firm in Chicago, Illinois. The outlined system called for a gas-fired convection oven with continuous dipping and bonding for an output of over 500 units per hr. All heating zones, cooling tunnels, dip tank and chamber were to be mounted overhead.

The final design for this bonding oven showed an overhead platform supported by ten 6-in. by 6-in. I-columns tied together longitudinally and crosswise by 12-in. WF members. Over-all length of this supporting structure is 91 ft, 6 in., with a width of 19 ft, 2 in. Along one side a balcony was added, extending into the second bay, with a length of 47 ft, 3 in. and a width of 6 ft, 0 in.

All gas burners, blowers, exhaust and recirculating fans, as well as the cooling tunnel fans are mounted on the balcony. On both ends of the enclosed system 35-in. catwalks and ladders are provided. The actual oven length is 85 ft, 6 in. with a width of 18 ft, 7 in. including dip-tank and chamber. With the exception of the dip tank all other components were located between the lower truss cords of the roof spans and the roof I-beams with a minimum of 12 in. clearance at the lowest point of the roof. At the location of the dip tank, which runs parallel to the oven, a cross lower truss cord had to be removed and new bracing for the roof span provided.

The chamber of the dip tank and drainbroad is provided with an internal catwalk over the whole length. The dip tank itself is 2 ft wide by 2 ft deep by 25 ft, 6 in. long with a power driven oscillating agitator to keep the chemicals in proper solution. This tank holds approximately 700 gallons of varnish at a constant level by means of a fixed overflow with a return drain to the supply tank. A special varnish pump provides for a 20 gallons per hr recirculating system. The dip chamber is totally enclosed up to the roof with access doors on either side.

The oven proper has five access doors, which can be reached from the end catwalks, blower platform and dip chamber. Six stacks through the roof provide for fresh air intake, cooling tunnel exhaust, and pre-bake and bake exhaust.

A separate dump and supply tank with 1500-gal capacity is provided outside the building in an under-

ground pit along the plant wall. See Fig. 2. This underground pit also houses a recirculating pump, mixing equipment from main underground supply tanks (one each for varnish and thinner) and a varnish heater for wintertime conditions.

As mentioned before, all burners and fans are located on a balcony next to the oven. However, all control equipment, electrical safety devices and main contactors to all motors are mounted on a control panel on the plant floor along the main aisle, which assures free and unobstructed access and control.

Apart from the motor contactors the panel includes a safety control unit with a time-delay relay for starting, high-limit temperature controls and ignition signals. All burner mixers are provided with air flow switches, pilot light safety assemblies, solenoid valves, and gas pressure controls. Oven temperatures are controlled by two temperature controllers.

Included equipment comprises the normally expected control and safety devices for a gas-fired oven system. This equipment protects the system against air, fan, power, gas and flame failure.

In view of the highly flammable varnish mixture several additional safety precautions have been taken. A sprinkler system is maintained over the complete oven and inside the dip and drain chamber. The entire dip process is also protected with an automatic CO_2 extinguisher system.

At its lowest point the dip tank is connected with an extra large drain and automatic quick-acting release dump valve for flow to the outside underground supply and dump tank. The latter is never filled more than 50 per cent of its capacity. All internal lights in the dip chamber and throughout the system and all other electrical components are of the explosion proof type.

The operation of the bonding system, once it has been properly regulated and adjusted, is entirely automatic. Startup and warmup takes a relatively short time (approximately 20 min). The startup consists of starting all fans and involves the operation of a time delay relay for a 12-min purging of the entire oven system. After this interval, pilot lights can be ignited from the control panel—proper indicating lights are provided. Main burners are then manually started on the balcony by actuating safety shutoff valves. By starting the main burners one by one at the balcony additional assurance for on-the-spot inspection is obtained. Shutdown is done by opening all burner and fan switches on the control panel. The varnish pump and both agitators in the dip and supply tanks are never stopped except for periodic maintenance.

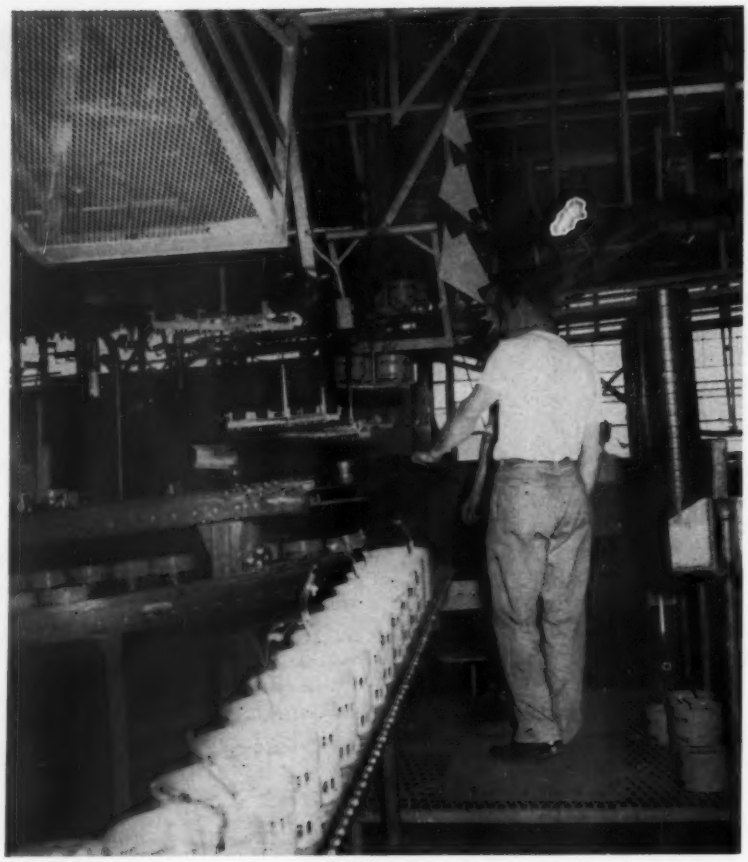


Fig. 3. Coated stators (arrows) coming down on chain conveyor for unloading.

After completion of erection and installation of all bonding equipment and initial regulation and adjustments, the startup and trials proved successful and uneventful of any serious defect. Later on some troubles were experienced primarily with the varnish recirculating system. A different pump, added heater controls, and some more adjustments remedied this situation.

Also, it was found that the drainboard did not always permit excess varnish to run back in the dip tank. In the beginning accumulated varnish leaked from the drainboard on the dip chamber floor. A changed construction of the drainboards and an asbestos sheet covering these boards cleared this up and also facilitated regular cleaning of the drain panels. Some additional heat distribution levels inside the oven improved the temperature differentials and the appearance of painted product surfaces.

The whole bonding system and its equipment is so well integrated with the roof structure that the casual visitor will walk underneath it through the aisles without noticing its presence or realizing that over his head a complex process goes on. The complete overhead installation not only showed up advantages, but gave the manufacturing engineers the confidence to order, within one year, an identical system to replace the old manufacturing facilities. A third similar system was installed in General Electric Company's motor plant in Murfreesboro, Tenn. **End**

WELDING REPAIRS BIG HOLE

Defect in press housing called for immediate action. Here's how unit was repaired—and in just 10 days.

FAST AND EFFICIENT repair techniques restored a large press in just 10 days. The press housing, weighing 27,730 lb, developed a serious crack in a six inch thick cast steel section, forcing a shutdown. The crack, about 24 in. long, came completely through the inner and outer walls but did not break out of the edges. The defect in the mild steel casting, probably the result of sand inclusions, necessitated immediate repairs which were undertaken by the A. R. Welding and Fabricating Company, Cincinnati.

View of defect inside housing after being scarfed out back to sound cast steel. Hole is two inches wide, 24 in. long.

Inside the housing was a large bronze bushing in which the press ram eccentric turned. The first step in the repair procedure was to remove this bushing. Then defective cast material was scarfed out by gas cutting torches and the resulting slot was beveled back on the inside and outside, as illustrated. This left an outer wall six inches wide, narrowing to two inches at the root of the six inch section.

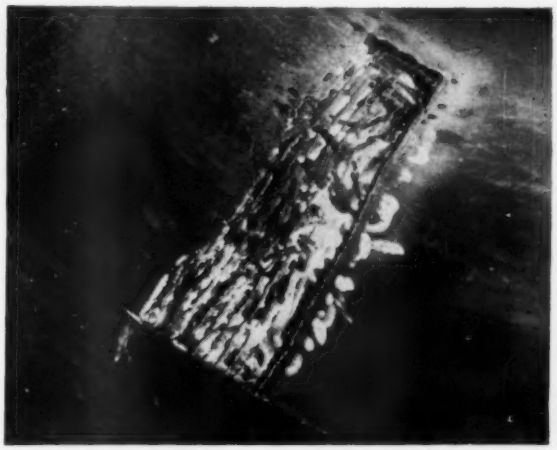
Before welding started, the area was preheated to 400 F by gas torches and kept at this heat until the gap was filled with weld metal. Root of the gap first was "buttered" with successive passes of a 3/16-in. electrode until it was closed. The remainder of the opening was filled by passes of 7/32 and ¼ in. Lincoln Jetweld LH-70 (AWS designation E-7018), a low-hydrogen iron powder rod designed for fast fill and maximum weld soundness. About 500 lb of rod were required for the complete job.

After every three of four passes, the weld area was checked with a dye penetrant to note possible cracking. All slag was cleaned between passes.

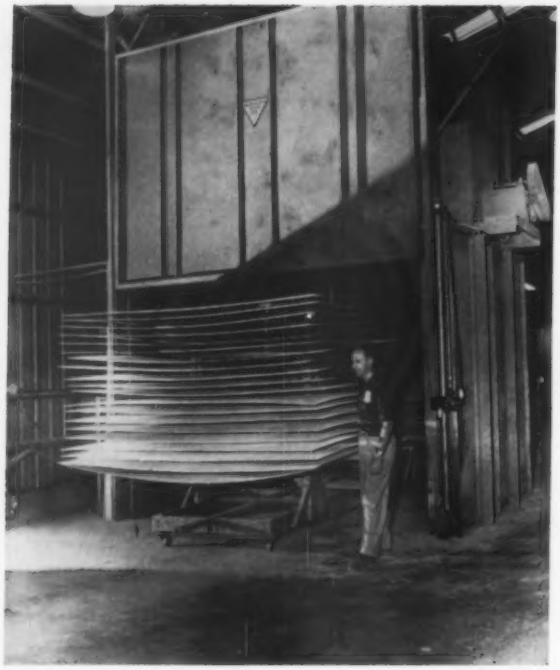
The entire housing was stress relieved at 1200 F and soaked for six hours before furnace cooling to 300 F and removal. Finally, the bronze bushing was repressed into the housing, no machining being necessary for the desired fit.

Repair work started on a Friday night and operators welded around the clock until Monday morning when the job was transferred to the stress relieving furnace. The press unit was back in service within 10 days of the initial failure. **End**

Outside housing, one side of defective area was beveled back, leaving a V-shaped opening six inches across the top.



Gap is nearly filled with passes of a low-hydrogen iron power electrode. Light areas are from interpass grinding.



At left is one of
the three new ovens used by
Plywall Products Co., Corona, Calif.,
to dry finish coatings
and provide plant heat at night.

THESE OVENS DO DOUBLE DUTY

Bake Coatings By Day Heat Plant By Night

By LYLE SMITH, Lombard Smith Co.

BY INSTALLING new-type ovens, which can be alternately used to process organic coatings or to heat the plant, officials of Plywall Products Co., Inc., have saved more than 50 per cent of the money that might have been spent on heating equipment for their new plant at Corona, Calif.

In establishing its west coast plant, the company had a particular interest in obtaining a site with normally dry climatic conditions. Land at Corona came close to being ideal in this respect. However, since the atmosphere at Corona can become quite cool and moist at night during the winter months, this location did not entirely eliminate the need for plant heating equipment.

Therefore, the plant's general manager B. A. (Bud) Cruse began wondering whether it would be possible to obtain ovens which could bake coatings during the day and heat the plant at night during the winter. The writer's company was, in turn, able to suggest a feasible solution in the form of three ovens which were subsequently made to order by Despatch Oven Co.

Largest and newest of Plywall's heaters is a direct gas-fired twin-funnel continuous conveyorized baking oven. It can handle two racks driven by independent conveyors through its work area simultaneously.

Because it was designed to polymerize thermosetting-type coatings at temperatures up to 300 F., the largest oven comprises double-wall metal panels with 3 in.-insulation and five zones of temperature control.

The first zone, or "flash-off chamber," uses a 12,500 cfm fan driven by a 3-hp motor and a 750,000 Btu duct heater which was engineered to bring about a 45 deg rise in temperature. Air in the flash-off chamber is not recirculated; instead it is brought in from the outside, heated, and pushed through the chamber so as to remove volatiles which are subsequently exhausted from the oven and the plant by means of 7500 cfm fans—each powered by a 2-hp motor.

Because the total exhaust capacity exceeds air input, the escape of coating fumes into the plant is thus prevented by negative pressure in the first zone.

Exit end of the largest oven is also doorless and has a 7500 cfm fan with 2-hp motor, which provides negative pressure to prevent the dissipation of heat into the plant. Being strictly an exhaust fan, the exit facility is equipped with a hood over the oven discharge.

In each internal zone, a 15,000 cfm fan driven by a 7-hp motor maintains a horizontal flow of air.

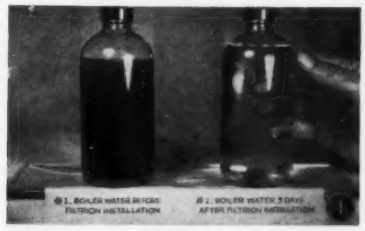
Return ducts are provided for the output of all fans, except for those in the flash-off chamber. In addition, each zone has its own indicating controller, high-limit excess-temperature cutoff, and electronic safety system.

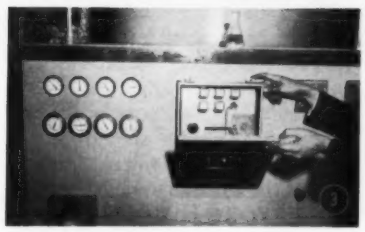
Due to the possibility that greater heating capacity will eventually be needed to bake finishing materials, Plywall's largest oven can be readily modified by replacing present gas burners—using one with a rating of 1,000,000 Btu in the first zone and a 750,000 Btu heater in each remaining zone.

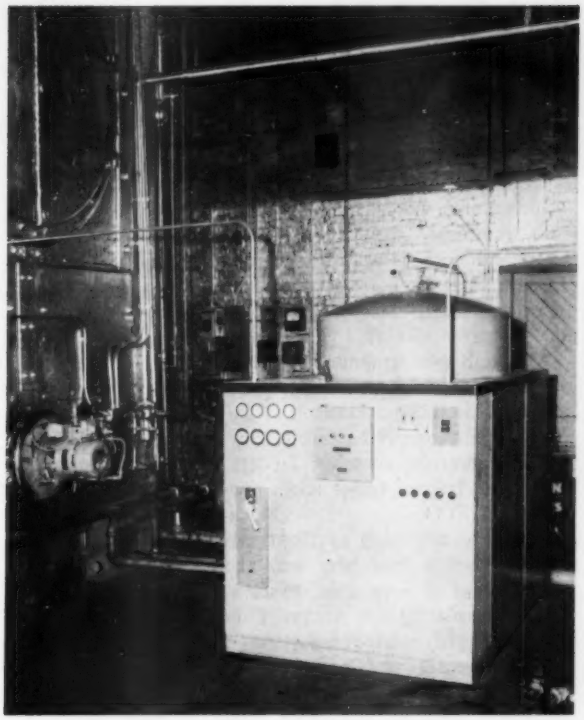
At night during the winter, when the Corona plant must be heated, Plywall's ovens are operated with doors open or with negative pressure zones eliminated so that much of their heat will be horizontally circulated throughout the plant. Further, each has an unusual Y-type flue which makes it possible to prevent the escape of warm air from the plant.

Each flue has two outlets and two dampers—one of which is always open while the other is closed. During the day, the opened and closed positions of the dampers are such that volatile-laden air in each oven will be vented out of the plant by means of a roof outlet in a normal manner. Conversely, when no finishing materials are being baked at night, the damper positions can be reversed so that warm air will be ducted back into the plant through an alternate outlet. **End**

Team Mate for Boiler Water Treatment







NEW SIDE STREAM FILTRATION OF BOILER WATER

Clarified water, reduced scaling and corrosion, little or no sludging, lower stack temperatures and automatic control are the pay-off provided by this system which can be used with any chemical boiler water treatment

By ROBERT BLEVITZKY, V. P. Research, Engineering, Sparkler-Filtrion Corp., North Chicago, Ill.

CONSERVATIVE ESTIMATES of boiler and piping failure caused by corrosion, scaling and carryover place the annual cost of maintenance, repair and replacement of this equipment at 250-300 million dollars.

Many investigators have trained their sights on those factors responsible for costly maintenance, explosion and excessive fuel consumption and much progress has been made in solving these problems. Scaling problems have been combatted by numerous methods including the use of softening equipment, deionizers, hot lime-zeolite plants, and internal chemical treatment with phosphates etc., while deaeration, pH control, organic additives, cathodic protection, etc. have been employed against corrosion.

The existence of sludge or scale deposits in the boiler frequently sets up local concentration cells which lead to serious pitting of boiler surfaces. Boiler water carryover is caused by either foaming or priming of the boiler. Priming has been diminished in many cases by alteration of boiler design or operating procedures. Foaming has been controlled by chemical additives and by limiting oil, dissolved and suspended solids.

In order to insure safer and

more economical operation of boilers, various societies, agencies, professional groups and individuals through the years have built up standards of operation and construction for both heating and power generating units. Typical of these are the standards set up by the American Boiler and Affiliated Industries Standards Committee for boiler water concentrations, Table I.

Such limits were arrived at both from practical, experimental and theoretical considerations and represented the best known method of operation, using existing equipment and processes available to industry.

Although performance has been good in most high pressure plants, it has required the utilization of extensive feedwater pretreatment, complicated controls, chemical feeders, and highly trained boiler room personnel.

One new approach to the treatment of boiler feedwater was the development of a reliable, continuously recirculating side stream* filter which would control suspended solids in steam and boiler water. Initial pilot tests, using this basic approach, yielded 1-5 ppm suspended solids, see Fig. 1, in the boiler. A development program was initiated to study the effects of side stream filtration in itself and also combined with internal chemical treatment, pretreatment, continuous blowdown, deaeration, and feedwater preheating. The completely automatic Sparkler-Filtrion boiler water control system was evolved after 18 months of field tests. In the system (see Figs. 4 and 5), boiler water is withdrawn from the various boiler blowdown connections, the skimmer connection, the low water cut-off float cage and the water column (boiler water level controller) by means of a pump. The hot, pressurized boiler water is then mixed with the intermittently flowing boiler feedwater just prior to the entrance of the combined stream to the filter.

The mixed stream of feedwater plus recycle boiler water, now filtered, is returned to the regular feedwater connection of the boiler. In conjunction with filtration, an automatic chemical feeder injects intermittently the correct amount of boiler water treatment chemical so as to maintain the correct pH, alkalinity, phosphate, and sulfite residuals and control return line corrosion. The feed system is designed to be adaptable to handle any supplier's proprietary internal chemical treatment.

A newly developed conductivity assembly sensing the conductance of the skimmer water, continuously monitors and controls the dissolved solids concentration of the boiler water. Filtration and cleaning cycles of the filter are automatically controlled by a filter boiler "sludge" pressure drop detector in combination with sequence controlled pneumatic valves. The temperature of boiler blowdown water is kept at 140 F by means of automatic dilution cooling built into the system.

The fully automated system described had its start in a large midwestern machinery plant with a multi-boiler installation.

Initially, it was concluded that comparative results should be secured on identical boilers with and without the Filtrion system. In these tests, three 400-hp and two 500-hp Scotch Marine boilers were made available for test. Manually operated systems were installed on one 400-hp unit and on one 500-hp unit. Two 400-hp and one 500-hp boilers were used for comparison.

*In side stream filtration a stream of boiler water is withdrawn from the boiler, filtered and pumped back into the boiler.

About the Author

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He is a graduate of the Chemical Engineering School of the Illinois Institute of Technology. Prior to his association with the Sparkler-Filtrion Corporation, he was Chief Chemical Engineer, Chemical Division of the Chemetron Corporation.

Test Procedure

All five boilers had been receiving internal chemical treatment. Inspection prior to testing showed the presence of 1/16-in. to 1/4-in. scale deposit in all boilers. Pitting was not a major problem, although the upper surface of the combustion tube water side showed some evidence of corrosion attack.

To study the effect of the Filtrion system on scale and corrosion, 8-in. sections of boiler tubing were thoroughly cleaned and polished to bare metal at each inspection hole in all boilers. Test plates were hung near the inspection holes in each boiler, see Fig. 6. During the test period of nine months, boilers were fixed at comparable ratings and efficiencies. They operated from a common feedwater source and were connected into common steam headers.

Descaling occurring in the boilers

Table 1. Water concentration limits set by American Boiler Standards Committee.

Boiler Pressure at Outlet, psig.	*Total Solids ppm	*Alkalinity (Total) ppm	*Suspended Solids, ppm	Silica ppm
0-300	3500	700	300	125
301-450	3000	600	250	90
451-600	2500	500	150	50
601-750	2000	400	100	35
751-900	1500	300	60	20
901-1000	1250	250	40	8
1001-1500	1000	200	20	2.5
1501-2000	750	150	10	1.0
2001	500	100	5	0.5

*American Boiler and Affiliated Industries Standards Committee maximum limits for boiler-water concentration in units with a steam drum.

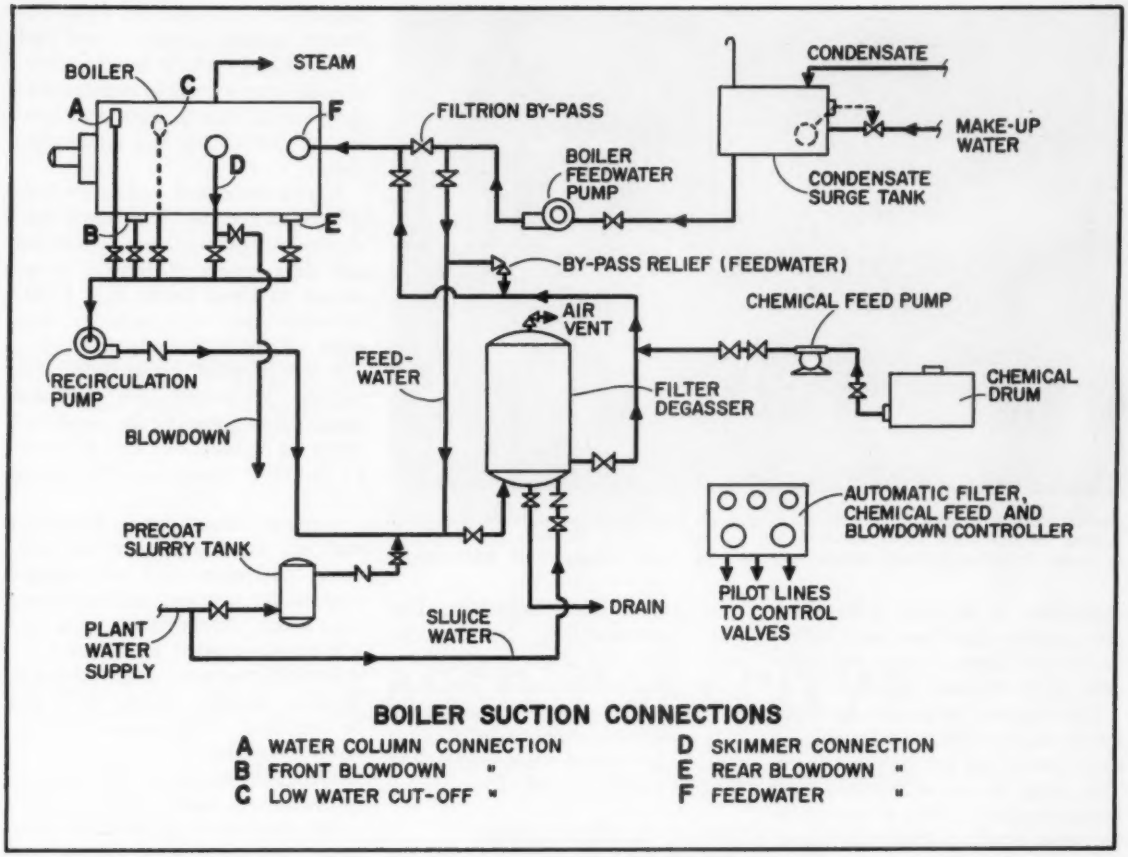


Fig. 5. Flow diagram of automatic boiler water control system which monitors, controls dissolved solids, eliminates sludge.

using Filtrion was attributed to shifting of the precipitation equilibrium and to the extremely low turbidity of the boiler water.

Inspection of the boilers at various intervals over the test period showed the polished tubes in the boilers with Filtrion systems were scale and sludge free and showed no signs of corrosion or pitting. Surfaces in the boilers without the system had considerable sludge and scale deposits and some corrosion.

A general boiler inspection of the five boilers showed another interesting phenomenon. The boilers with the new system showed a reduction of existing scale and the absence of sludge on the tubes or the boiler drum or shell. There was flaking off of old deposits.

In those boilers not employing the system, sludge and scale continued to accumulate at the usual rate and the stack gas temperature on these units was 20 F higher than on the others, Fig. 2.

The boiler make-up water used in the above test work was relatively hard and averaged around 295 ppm total hardness as calcium carbonate. The filter component functions as 1. a feedwater preheater; 2. pretreatment section for feedwater; and 3. filter to remove practically all suspended matter in the boiler water and feedwater.

Removal of Contaminants

The Filtrion system is so designed that all condensate, whether process, turbine, or heating load, passes through the precoated filter unit. This enables complete removal of rust, oil and other immiscible process contaminants which can and do cause serious damage to modern boilers. The precoat on the filter surface, as well as the sludge buildup on the precoat, helps to reduce suspended silica entering with the feedwater make-up or raw water contamination from condensors and heaters.

Since the suspended material in all boilers operating with Filtrion systems was 0-5 ppm, it was possible to operate them at the maximum allowable dissolved solids concentration without carryover. Operating at high dissolved solids resulted in lowered percent blowdown and decreased chemical requirements necessary to maintain proper residuals.

Conductivity tests on condensed degassified steam samples showed a great increase in purity over a wide range of operating conditions. Indications were that this was chiefly a result of the ability of the system to maintain very low suspended solids with controlled chemical feed. Comparison of the corrosion rates of the steel specimens removed from the boilers showed a decline in corrosion in Filtrion treated boilers.

In all tests, an attempt was made to control boiler water con-

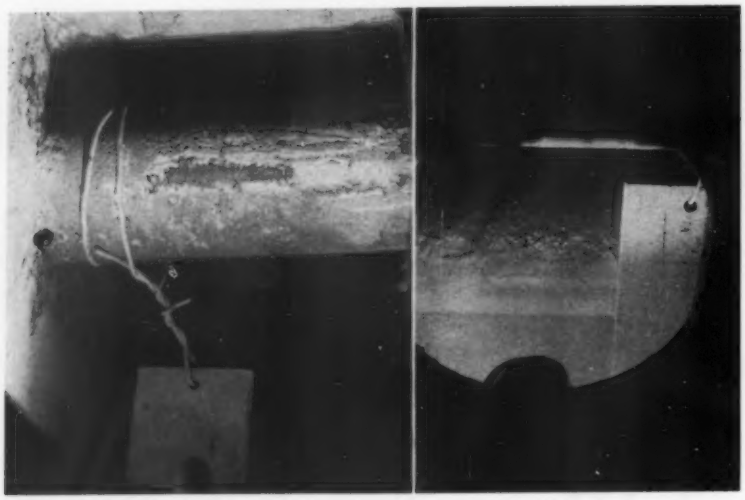


Fig. 6. End of test period shows absence of new scale on cleaned tube and flaking of old scale from second tube in boiler using Filtrion (left). Tube in boiler without system shows accretion of scale during same test period.

centrations at the same level wherever possible, but there were differences that resulted from the influence of the Filtrion system itself.

For example, the percentage blowdown was less for boilers using the new system than for the other three. The major factor in this case was the necessity for extra blowdown in the latter group in order to control the suspended solids concentration at a reasonable level. This was not the case in the Filtrion treated boilers, since the suspended materials in these boilers was close to zero. Therefore, only that amount of water necessary for dissolved solids control was removed as blowdown.

Additional characteristics are economical preheating of the feedwater, liberation of dissolved gases from the feedwater, high unit filtration rate, low pressure drop and low filter aid requirements.

In the pilot tests, the rate of oxygen removal by deaeration was considerably greater than chemical scavenging by the sodium sulfite present in the recycle boiler water. This was due to the relatively low oxidation rate of sulfite as compared with gas evolution caused by the sudden temperature rise of the feedwater when mixed with recycle water. Feedwater deoxygenation and hardness removal proceeded most rapidly after a small amount of impurities was accumulated on the filter. It was concluded that the impurities composing the filter cake acted as a catalyst promoting precipitation of more impurities. The rate of pressure drop rise was very nominal in view of the large quantity of cake accumulated. Filtration at high temperatures using filter aids especially compounded for use with boiler waters, were responsible for this success.

Automatic Chemical Treatment

Operation of a new automatic system showed the same advantages as the pilot units with the additional advantages of automation of chemical treatment and blowdown, see Fig. 3. Boiler water concentrations on this unit are automatically kept at 3200 ppm dissolved solids and less than 3 ppm suspended solids. The average length between each automatic cleaning cycle on this particular unit is seven weeks.

Exhaustive tests have shown that this unit has eliminated sludge and suspended solids and materially decreased scaling, corrosion, and fuel and chemical waste in boilers. Higher steam purity reduces maintenance of strainers, valves, traps and controls in the steam and condensate system.

High iron-content waters are easily handled because of the rapid conversion by precipitation, oxidation and dehydration of ferrous bicarbonate to ferric oxide in a highly filterable state. High turbidity, high silica, or high alkalinity feedwaters can be handled successfully. Oil bearing feedwaters are rendered practically oil free by the combined effect of adsorption and filtration by the filter precoat and the sludge cake.

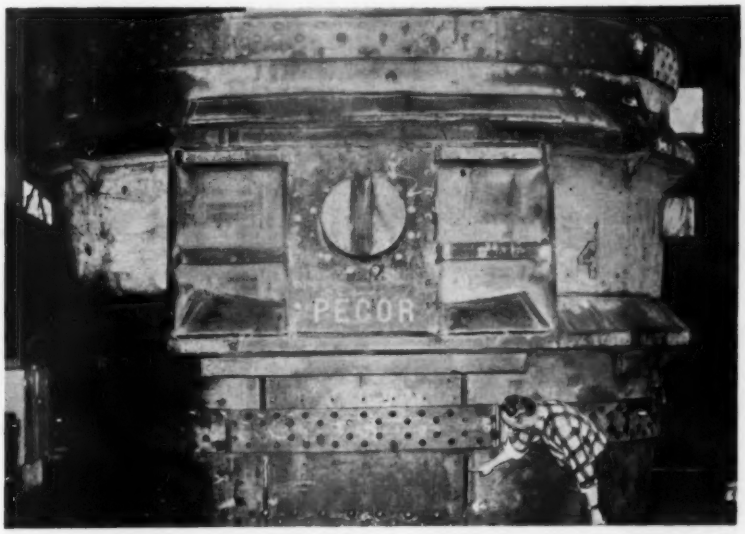
Filtrion systems can be integrated with any existing pretreatment softening equipment and will operate successfully with any preconditioned feed water. Application of the system is not limited by boiler type, operating pressure, make-up water analysis or rate, method of firing, or existence of blowdown heat recovery systems.

Generally speaking, the selection of the correct model is preceded by a thorough study of the boiler type, steam and condensate system, and analysis of the make-up water, feedwater and boiler water. Steaming rate, operating pressure, feedwater pump characteristics, make-up rate and other variables enter into the selection of components.

The author is indebted to Messrs. Fred H. Horne and A. C. Kracklauer of the Sparkler-Filtrion Corporation, North Chicago, Ill., and numerous authorities in water treatment, boiler design, and boiler insurance for their encouragement, suggestions and advice in this development. **End**

Want More Information?

A great deal more data on the side stream filtration system is available to interested readers. The data results from the six-months-long tests conducted by Author Blevitzky on the five Scotch Marine boilers mentioned in this article and includes tables on the filter component operating characteristics; water, steam and combustion analysis; and scaling and corrosion measurements. It is available from Robert Blevitzky, Sparkler-Filtrion Corp., 24th and Commonwealth Ave., North Chicago, Ill., or by writing "Filtrion" on the reader request card elsewhere in this issue.



Capacity of this teeming ladle was increased by 50 tons with the addition of center section. Man points to the welded vertical seams of the new section.

NEED INCREASED CAPACITY?

If so, have you considered rebuilding heavy equipment?

WHEN PRODUCTION requirements heavily overload manufacturing facilities, management immediately asks this question: "Must we make capital expenditures for new and larger equipment?" Often, the volume of production increases does not warrant such expenditures, yet production delays can seriously endanger costs, delivery, customer service and competitive position.

Re-engineering and rebuilding existing equipment, often offers an apt solution to each of these phases. The investment involved is considerably lower, making write-off less important. Speed in making the alterations is generally far greater, and overall cost is frequently 50 per cent of new cost, or even less. In the steel industry, for instance, operators are learning to use "all but the squeal" by re-engineering and rebuilding existing equipment.

Pennsylvania Engineering Corporation, Newcastle, Pa., are constantly working on such modernization projects. For example, they recently re-engineered and rebuilt a 250-ton steel plant teeming ladle, and increased its capacity to 300 tons. Total cost was approximately 50 per cent that of a new ladle the same size.

The operation involved return of the ladle to PECor's shop where the first step in rebuilding was the removal of the trunnion pin and block assembly. The ladle was then cut through the center of the sides and bottom. Between the divided halves, new side and bottom plates of correct weight and dimension were installed. All vertical seams were welded, and new sections of riveted splice bands were made to overlap the joints. The trunnion pin and block assembly was then repositioned and the ladle given a final check before shipment.

As a rule, the original trunnion pins are adequate for the increased capacity, but where new ones are necessary they can be installed at reasonable cost.

At the same time work is in progress on the size increase, the entire ladle was reconditioned to put it in like-new condition.

In another instance, the base castings on two large steel ingot manipulators were built up by automatic welding. These castings were then remachined to original tolerances. In this particular case, the cost of getting new patterns made, making the casting, and machining would have been entirely prohibitive. The time required to do the job would have been almost a year, as compared to the month required for rebuilding.

Another typical example of rebuilding to increase capacity was a scale car, which originally carried 320 cu ft of ore. By re-engineering, the payload was boosted to 380 cu ft.

Other equipment recently modernized includes: steam turbine runners, crushers, stripper shovel booms and sticks, rolling mill tables, hot metal mixers and converters. **End**

EXPLOSIVE FORMING, SLICING AND EXTRUDING

Industry's Newest, Slickest Trick and What It Means to the Plant Engineer

SOONER THAN you think many of you will be posting your plant with signs warning, "DANGER: HIGH EXPLOSIVES." For U.S. production seems destined to "boom" as a volatile new metalworking process—explosive forming—takes over, occasionally, from punch press and drop hammer.

It's a "boom" calculated to be heard around the maintenance world for it confronts the plant engineer with some knotty problems . . . and with some hitherto unanswered questions.

Quite aside from the question, "What is explosive metal forming?" is, maintenance-wise, another one: "How can explosives be used safely in my plant?"

For involved is volatile stuff: charges ranging from relatively low-powered gun powder (sometimes fired in shotgun-like blank cartridges) to high explosives (like primacord and RDX). Also used are the so-called "fast burning powders," among them nitroglycerin.

Lethal though these new tools may be in large quantities, the fact is that only finger-sized charges (seldom more than 6 oz and often less) accomplish the job . . . literally blast to shape the toughest, most contrary of metals.

Forming Metals

How does dynamite—and even more lethal explosives—do it?

Says Keith Wilhelm, consultant to Olin Mathieson Chemical Corp., "Explosives literally break a metal's back . . . take all the fight out of it. During a single explosive instant, metals—or rather their molecules—turn molten. It's as though you slapped a piece of putty against a wall. The putty conforms to the wall. And so does even the toughest metal conform to a die when, for no longer than a few micro-seconds, it becomes metallic putty."

Continues Wilhelm, "Where, by other forming methods metals like titanium fight back, resisting attempts to shape them permanently, the explosively-formed workpiece hugs the mold . . . and stays put."

Explains another researcher, "The real secret to forming metals with explosives . . . is shaping the shock waves inherent in high explosives and making them work for you."

Slicing Billets

Shock waves can be harnessed to "shape" a part without dies. Shock waves also can cut—can slice the largest billet in a fraction of a second. The best diamond abrasive wheel might take a dozen hours for the same big-billet cutting job.

"The 'cutting blades'" explains another explosives engineer, "are two invisible wave fronts, moving toward collision from opposite ends of the billet and traveling at perhaps 30,000 feet per second . . . the velocity of a missile escaping from earth. When the fronts collide—within the billet—they neatly slice the metal."

Extruding Metals

Or consider another explosives job applicable to your own plant: extruding billets through close-tolerance dies. Explosives propel billets so fast through a die that the die doesn't heat, thus may last for hundreds of passes rather than a handful, as currently.

Incidentally, explosive-extrusions may pose a major problem for plant engineers. The problem: how to stop the flying spear of extruded metal? Some explosively extruded pieces exit the dies traveling better than 500 ft per second (compared to 150-ft per second in most current processes). At the moment, some exploded extrusions are "stopped" in a tank of high temperature oil or water. Magnetic fields, set up around machines extruding steel alloys, may be able to slow and stop the extrusions. Some are "fired" into a sand bank, much as you'd find on a rifle range.

"Ideally," says one researcher, "we should build the explosive extrusions plant six blocks long . . . so the extrusion can run its course."

But even this "ideal" falls short of perfection: for gravity, working on the fast-flying metal, tends to deform it.

Lockheed Aircraft's Glen Rardin, one of industry's most explosive-minded researchers, says simply, "We're dealing here, basically, with nothing more than energy . . . the tremendous energy inherent in explosives."

"And," he continues," force is force, no matter what its origin. All you have to do is direct and contain it . . . to turn it productive."

The "directing" will be the production engineer's job. It's the plant engineer who'll have to worry about containing this, one of the most economical but powerful of forces.

For example, a giant 9-story drop press, which may cost $500,000 and weigh upwards of 600 tons, seldom manages to exert more than a few hundred thousand pounds of pressure per square inch. A lot of pressure? It is . . . but not enough to handle some of the newer metals. By comparison, a dollar's worth of high explosives may generate 7,000,000 pounds of pressure, enough to blast into shape the most contrary of space age metals: titanium, stainless steel, beryllium and molybdenum.

All of which bills explosive forming as a "comer" to plants everywhere. Moreover, the process is already a practiced, albeit experimental, art in some plants.

Sound-suppressor tubes on Boeing's 707 jetliner are blasted to intricate shape with a single explosive charge. Forming, including detonation, welding and finishing, involves eight operations. By conventional methods, twenty-four operations would be required for the same job . . . if conventional forming could do the job at all.

One company has been making turbine parts—shaped by blasts from shotgun shells loaded with black powder.

Aerojet-General's Chino Hills Explosive Research Lab, in California, shapes missile domes by explosives. The Moore Company of Marceline, Missouri, has for years used dynamite to blast to shape its line of fan housings. Dynaform Corporation in Birmingham, Michigan, has been successful in forming a long line of metals both with dynamite and higher explosives. Convair's Fort Worth plant has set up an experimental explosive facility. And so has American Potash and Chemical Corp., at its West Hanover, Mass. plant. In all, more than two score U.S. plants either use explosives in limited or experimental production or are building facilities.

How your plant uses explosives will, of course, determine what facilities you build.

Currently, explosive charges are forming metals in a number of different ways:

1. Direct forming with cartridges. A heavy explosion-resisting die is sealed in a retainer. The metal blank destined for forming is laid against the die halves. A cartridge, inserted in a port at the dies' top, is detonated. Gas pressure forces the metal to conform with the die.

2. Hydraulic forming with explosives. Forming dies, set inside a sealed retainer, are immersed in some fluid (usually oil or water). A piston, pressured by detonation of a cartridge, transmits pressure through the hydraulic fluid which in turn forces the workpiece into the dies.

3. Cartridge powered piston. Expanding cartridge gases actuate a piston which, its impact greatly in-

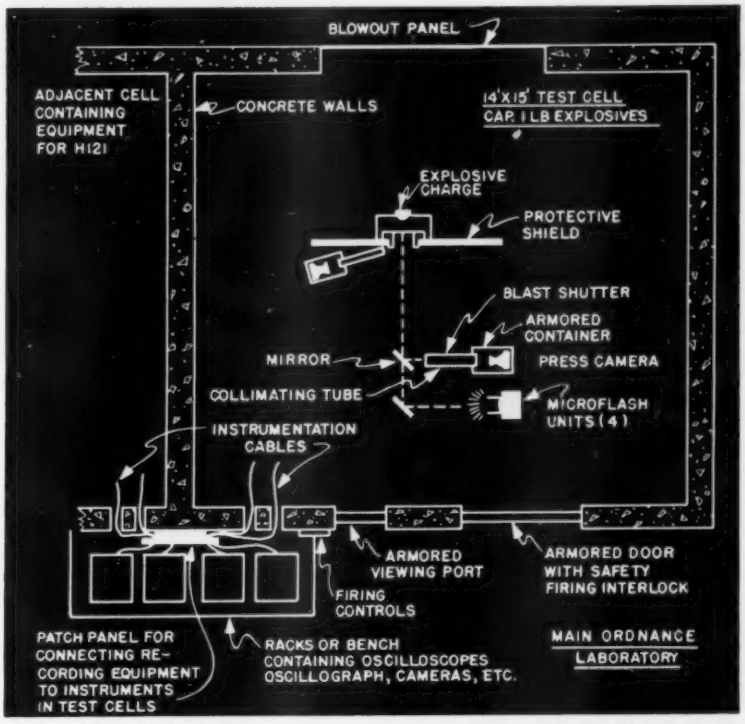


Fig. 1. Plan view of test facility of Lockheed's at Santa Cruz, California. Note how doors and ports are armored and room is provided with blowout panel.

Fig. 2. Explosive forming facility installed by Lockheed Aircraft at Santa Cruz.

Explosive Forming—and What It Means to the Plant Engineer

creased, shapes the blank as would a conventional drop hammer.

4. Explosive cutting. Explosive charges, fastened to either end of a billet, are simultaneously detonated (usually, out-of-doors). Shock waves, inrushing from opposite ends, cut the billet.

5. Extruding with explosives. An explosive charge, either propelling directly or through a piston, forces billet through the dies.

6. Shaping metals explosively without dies. This method, in the experimental stage, uses a "shaped" charge, its wave front dimensionally shaped to finished tolerances. The wave front is controlled so that it "dies" abruptly, expanding a blank to precise shape without molds or, at most, using only plastic or breakaway molds.

At the moment, explosive facility specifics are hard to come by. For one thing, much depends on the explosive application. Example: in some metalworking applications, the explosive charge is so small and so controlled that it can scarcely be heard. Such a press could, and does, work adjacent to other departments without disturbance . . . and with but little danger.

Secondly, there is scant standardization of explosive regulations, where they concern state, county and city. Some municipalities prohibit any explosives within a plant. Others permit them . . . if proper safeguards are set up.

In one experimental production setup, for example, so little explosives turn the trick that, standing but a few feet from the production dies, you hear only a hammer-like concussion.

Says one researcher, "The production machines—once they're perfected and installed—should cause the plant engineer no more trouble, say, than a machine actuated by air pressure."

Comments another, "The plant engineer's biggest problem will be handling and storage. Accidents, if there are any, will occur *outside* the production machines themselves. Inside, with the explosion encased in steel, even a premature detonation will be harmless."

"Regardless," says a Lockheed expert, "it is probable that explosive production facilities will have to have grounded floors, blowout windows, proper ventilation . . . and explosion-proof electrical outlets. Everything, in fact, that you'd expect to find in an arsenal."

To date, two plant-important engineering studies have been conducted by Lockheed Aircraft Corp.

The first report ("High Energy Rate Metal Forming", period Oct. 18, 1957 to Feb. 28, 1958) was released last fall. The second, covering work conducted from July 1 to Sept 30, 1958, has only just been released. Both were underwritten by the Manufacturing Methods Division, Air Materiel Command, Aeronautical Systems Center, Wright-Patterson Air Force Base, Ohio.

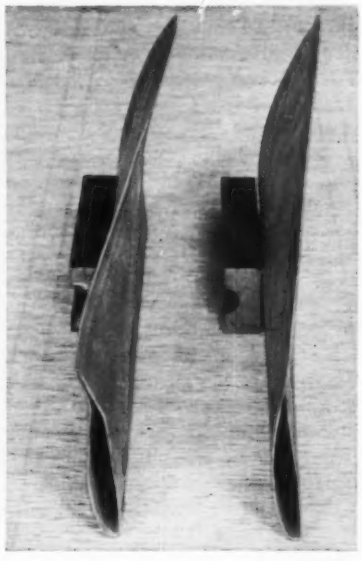
Who's Doing What?

Let's see, from these reports and from a special survey made by PLANT ENGINEERING, how various experimental and production facilities have, to date, been set up and are operated around the United States.

1. Chrysler Missiles Division, in forming a bulkhead for a missile, turned the actual detonating job over to The Moore Company (Chrysler management, it is reported, would not agree to having the actual work in their plant or by their own personnel). Moore Co.

Fig. 3. Two-piece die forms stainless and titanium vanes. Note contoured opening in side of die, right. From here, blast pressure, supplied by a shotgun shell provides pressure of 8000 psi. Dies are heated to 1000 F to make forming easier.

Fig. 4. These are complex stainless steel vanes formed on die at left and are finish-formed by shotgun shell.



has used explosive forming for years.

In forming the hemispherical shaped part, a 27-in. diameter by 0.270 in. thick aluminum blank was placed (out-of-doors) atop an open-end draw ring. Another steel sleeve (10-in. in depth, with 9-in. wall thickness) was placed directly atop the blank. The blank was not clamped in place because the heavy-weight sleeve (weighing 2000 lb) served as a clamp. A polyethylene bag, filled with water, was placed inside the top sleeve. Dynamite (a 4 to 6 oz charge) was suspended in the water and a 650-lb lid placed atop the sleeve (to contain the explosion). The charge was detonated . . . shaping the part.

2. At Fort Worth, Convair has located a complete explosive metal-forming test facility at one end of its plant site. Included are powder magazines, shooting pits, bunkers, etc. But Air Force and local regulations limit Convair to storing but 10 lb of high explosives, and further limit individual shots to a maximum of 4 oz.

The firing pit is a 10-ft deep hole tapering from 6-ft diameter at its top to 4-ft diameter at the bottom. The pit is lined with a ¼-in. rolled steel can. This liner is backed by gravel and sand.

Operationally, the can is filled with water. The die is then lowered by monorail and suspended at proper depth. Next, the metal blank destined for explosive forming, is fitted into the die. The charge, remotely fired, is then lowered mid-center of the die. A vacuum is drawn and the charge detonated. Hydraulic action literally hammers the blank into the die.

As in almost all explosive forming operations, the charge itself costs but a few cents.

3. The Moore Company forms fan hubs from Monel metal in two bolted dies. Inside them goes a water-filled polyethylene bag. The six-ounce charge (50 per cent ditching dynamite) is centrally suspended in the water. And a lid weighing 300 lb and tethered by stout cable is clamped atop the die. The charge, detonated, forms the part.

4. Lockheed Aircraft Corp. has built two explosive forming facilities, one at Burbank, Calif., by converting a bomb shelter to explosive testing and a second at Santa Cruz.

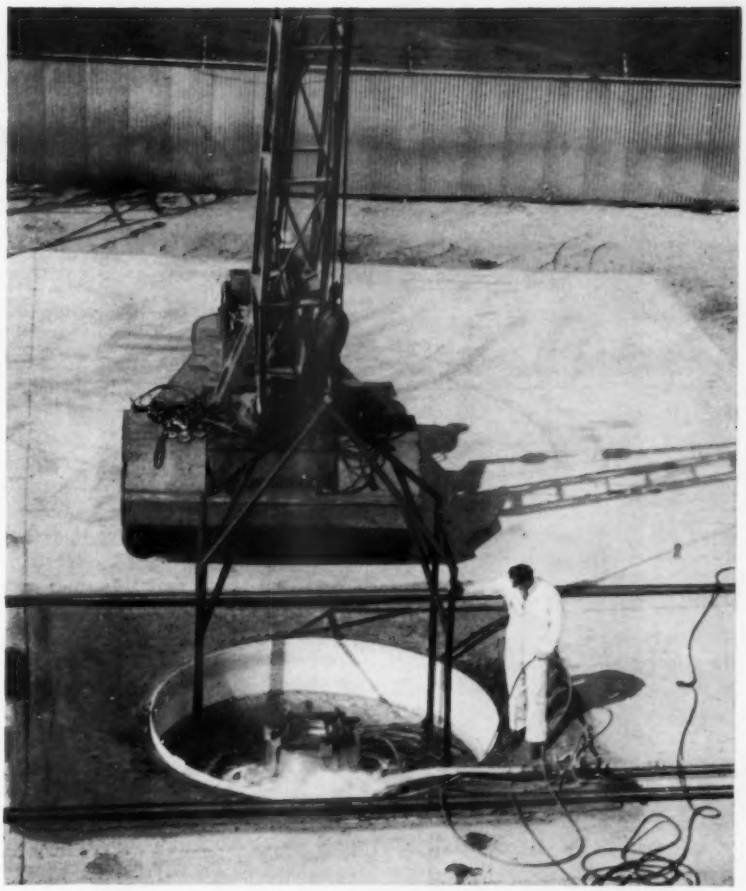


Fig. 5. Explosive-forming facility at Ryan Aeronautical Company's plant. Die and part are lowered into a water-filled pit before the explosive is detonated.

This, a heavily reinforced concrete chamber, is designed to withstand the explosive effects of upwards of one pound of high explosives. The lab is equipped with blow-out walls, armored inspection windows and armored safety doors.

Both test facilities were built to contain rather modest-sized forming dies.

The Burbank bomb shelter conversion meets local safety regulations by being installed with grounded floors, vapor-proof lighting, safety switches, steel firing tanks and steel doors.

Higher explosive experimentation goes on at Santa Cruz.

Typically, the Burbank facility's walls are 12-in. thick (reinforced concrete) and enclose three labs: a firing, loading and work lab, plus an adjacent "ready storage area" for explosives. The entire building is 45 by 16 ft. The firing lab, 11 by 16-ft, is rigged with armored viewing ports, an armored door with safety firing interlocks and blow-out wall panels.

Most explosive forming experts believe that existing local-state laws will almost certainly require that production facilities be separated from existing plant buildings. In truth, however, it is likely that explosive forming machines, once in operation will pose no great problem to plant maintenance. But handling and storage of raw explosives will.

Thus, to date, most "production" forming—as the explosive shaping of the Boeing 707 noise suppression tubes—has been contracted out to experts . . . to companies specialized in the art and practice of high explosives.

Still, sooner than you think you may be posting your plant with "DANGER: HIGH EXPLOSIVES" signs, as explosive forming takes over from the more conventional punch press and drop hammer. **End**

INSULATION, PROPERLY APPLIED—
Heat and Dollars Saved in Piping Systems

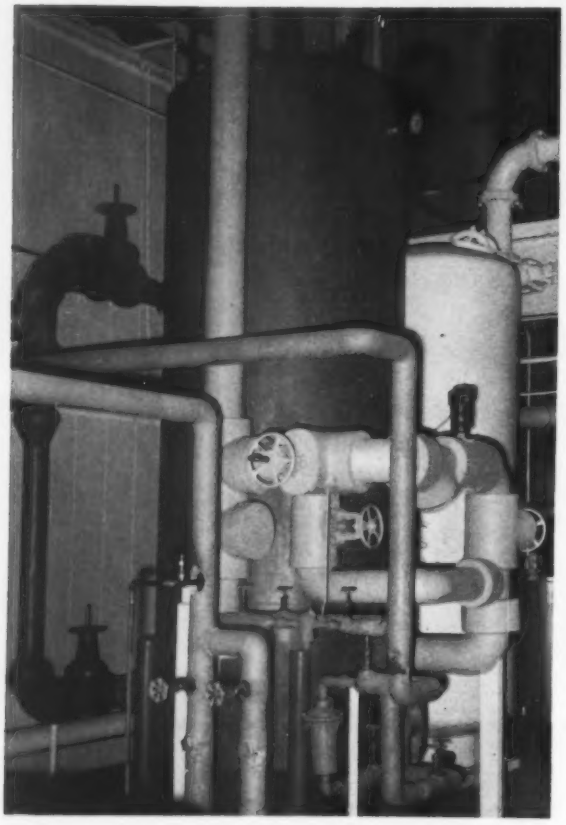


Fig. 1. Magnesia-insulated tank and piping. Tank insulation finish is asbestos-Portland cement mixture, canvas, paint.

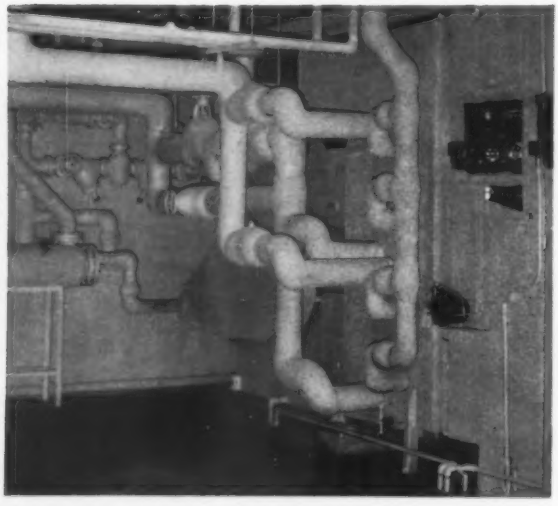


Fig. 2. Elbows, flanges and valves get "fitted" insulation.

FOLLOWING ITS own slogan, *"Think,"* the International Business Machines Corp. carefully planned every phase of its new Rochester, Minnesota plant. High on the list of important items, in deference to the climate, were the heating plant and its insulation.

Atmospheric temperatures in the Rochester area—ranging from over 100 F in summer to -40 F in winter—indicated that considerable attention should be paid to insulation of hot piping and equipment to assure maximum fuel conservation and efficient operation. Insulation engineering and calculations were based on winter temperatures averaging between 10 and 15 F.

Steam for heat, hot water and process needs for the plant, laboratories and offices is supplied from a separate powerhouse. As the steam generating unit, two oil- or gas-fired furnaces with tube-type water-cooled walls are employed. Each boiler has a capacity of 70,000 lb steam/hr when operating at 160 psig.

All water walls, the roof of the furnace and the first pass of the boiler are backed with 2½-in. firebrick tile laid in high-temperature cement and then covered with 5-in.-thick diatomaceous silica block. The balance of the side walls are backed with 2½-in. firebrick tile and 4-in.-thick diatomaceous silica block insulation layers.

Similarly, the rear wall and floor are insulated with 2½-in. firebrick and 3-in.-thick blocks of the same insulation for the wall and 2½-in.-thick blocks for the floor. By butting the silica blocks firmly and pointing up with insulating cement, the furnace is protected against air leakage. Wire mesh was secured over the insulating block and the entire unit finished with insulating cement.

The air heater is also insulated with diatomaceous silica. Casing for the heater consists of fabricated 3/16-in. plate covered with 3-in.-thick silica block and an outer casting of 10-gage steel plate.

Exposed portions of the drums are insulated with 2-in.-thick mag-

nesia block held in place with annealed iron wires. The insulation is covered with wire mesh, a ½-in. coat of hard-finish asbestos cement troweled smooth, and a jacket of 8-oz canvas neatly pasted on. To apply the insulation, heavy wires were first wrapped around the surface of the shell and hairpin wires were looped on these cables at frequent intervals; the 2-in.-thick magnesia blocks were secured with annealed iron wires attached to the hairpin wires and drawn tightly to a wire cable looped around the manhole openings.

Oil (fuel oil No. 6) for the furnace is stored in a storage tank. Easy flow through the supply lines—particularly in cold weather—is maintained by heat from steam supplied from the powerhouse to the tank and lines.

Fuel Lines Insulated, Too

All fuel oil lines in the powerhouse, including burner supply headers, return valves, strainers, etc., are insulated with 1-in.-thick magnesia. Removable molded insulation permits easy servicing of the strainers. Exposed outdoor fuel oil lines are weatherproofed with a jacket of 50-lb asphalt-saturated roofing felt.

A 2000-gal surge tank, 60 in. in diameter and 15 ft long, receives the condensate. From this tank the condensate is gravity fed to a 150,000 lb/hr feedwater heater mounted on a horizontal, 460 cu ft storage tank. The feedwater heater, surge tank and storage tank are insulated with 1½-in.-thick magnesia blocks fitted closely together and secured in place with corrosion-resistant wire. The insulation is finished with a mixture of 50 per cent asbestos cement and 50 per cent Portland cement, smoothly troweled, and an 8-oz canvas jacket. Lines entering and leaving the heater, strainers, valves and fittings are insulated with 1-in.-thick sections of magnesia. Essentially the same insulating techniques were used for the hot water generators, converters and blowdown flash tanks.

Above the boiler room floor, there is one steel stack for each boiler. These stacks, the breechings and hot air ducts are insulated with 2-in.-thick 85% Magnesia blocks. On the breeching and air ducts fastening clips are provided to hold the wire used to secure the insulation. Sized canvas is pasted over the insulation and a coat of paint applied.

Steam supply lines, headers and branches in the manufacturing plant, power house, tunnels and conduits are insulated with magnesia. For high pressure lines nominal 2-in.-thick sections are used; for medium pressure pipes, nominal 1-1½ in.-thick sections and for low pressure lines 1-in. nominal thickness is used. Insulation on fittings and valves is built of magnesia block to the same thickness as that of adjacent piping and covered with an 8-oz canvas jacket, pasted down.

Underground steam and condensate piping was installed in a conduit system built by combining factory-built, pre-sealed insulated pipe units. Each unit of pipe comes from the factory insulated with molded magnesia and finished with a waterproof cover.

Spaced clevis, roller or trapeze hangers (every 8 ft for 1-in. pipe, 10 ft for 1½-and 1¼-in. pipe, 12 ft for 3½-in. pipe, and 20 ft for pipes 4 in. and larger) support the piping system. On piping 2 in. and larger, protection saddles are used.

Expansion and contraction in hot piping is taken up by loops, bends and expansion joints. For steam piping 450 F or less, expansion bends are used.

In addition to the steam generating units, the power plant houses two centrifugal refrigeration machines. The barrel, steam and exhaust ends of the multi-stage condensing type turbine—used in connection with the refrigerating units — are insulated with magnesia covered with a metal jacket.

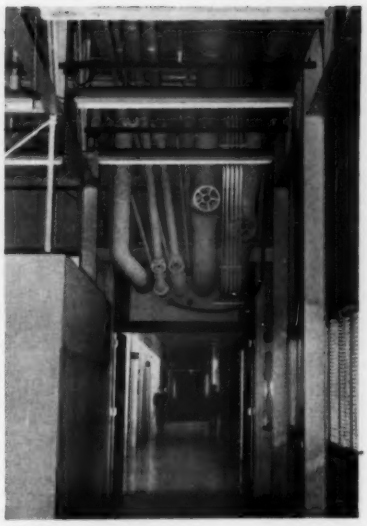


Fig. 3. Piping carrying steam and water to office building is well-insulated.

Because of its large size, the warehouse has its own package-type heating plant. A fuel oil (No. 2) for this boiler is supplied from a 15,000-gal underground storage tank to a steam preheater and then to an electric heater.

The boiler is insulated with 2-in. thick blocks of magnesia; the hot water converter and all steam piping are insulated with 1-in.-thick magnesia blocks. Application and finishing methods are similar to those in the powerhouse and plant. **End**

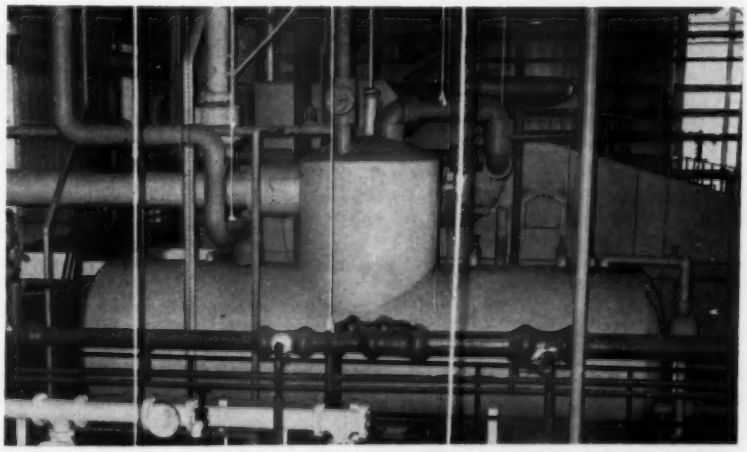


Fig. 4. Over-all view shows insulating methods: block, cement, precut sections.

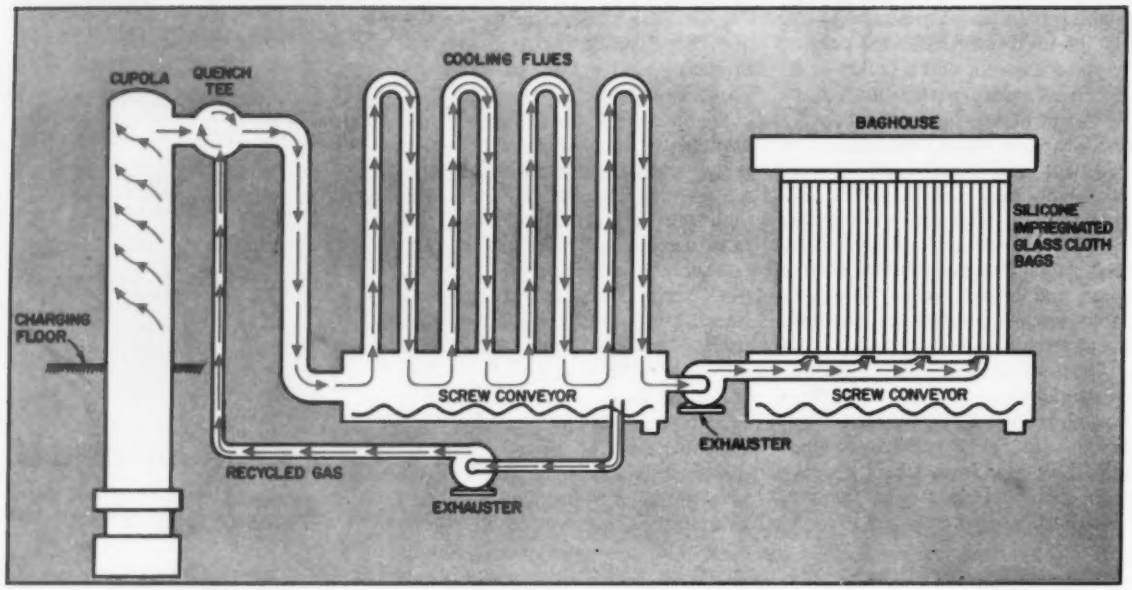


Fig. 1. Schematic diagram of baghouse smoke collector. Colored arrows indicate path of hot gases through the collector.

DRY COLLECTOR CUTS COSTS

Alhambra Foundry's Baghouse Collector Meets Design Needs With Low Maintenance

By PAUL SIECHERT, General Manager, Alhambra Foundry Co., Ltd.

IN ADDITION to meeting high operational standards, a dry baghouse smoke control unit now in use at Alhambra (Calif.) Foundry Co., Ltd., has saved, we estimate, about half of the money that might have been spent maintaining a different type of equipment.

The unit is classified as "dry" because it lacks the water cooling accessories commonly used in connection with filter-type smoke collectors—having, instead, a series of radiant air cooling flues for the reduction of the temperatures of cupola emissions. Efficiency of the flues is such that gases entering silicone-impregnated glass fabric retainers in the baghouse have been cooled from about 2000 F to less than 430 F, which is low enough to assure long bag life.

Developed by H. B. Menardi & Company, Los Angeles, the equipment has been proved by more than a year of continuous operation.

Its installation necessitated the design of a ceramic-lined cap for the foundry's cupola. Provisions were made for counter-balances in this design—not only to permit the automatic release of abnormally high pressures in the cupola, but to allow the manual raising and lowering of the cap before and after fire-extinguishing operations. All this was due to a belief that steam produced in extinguishing cupola fires would cause trouble, if it were allowed to enter the baghouse. However, experience has shown that the manual opening and closing of the cupola's top breaks hard-to-replace packing around the cap's seal; and that no apparent damage is done when steam enters the baghouse. Therefore, the cap is no longer being manually removed. If a replacement component of this type should be required its design could be simplified.

A firebrick-lined outlet was situated near the cupola's top so as to feed smoke into a tee, where quench air is applied by a blower as indicated in the diagram on this page. This reduces the temperature of the cupola effluent from 2150 to 1100 F, and permits processing of the gases through flues made from mild steel rather than alloy steel.

From the quench tee, gases are conducted through a balloon flue to a header which feeds two parallel lines of

cooling flues. The latter is comprised of 38 in. diameter pipe with eight U-bends, 45 ft high, and a common hopper.

An exhaust fan draws gases through the cooling flues to a baghouse pressure chamber. Because the baghouse hopper has a positive pressure of 3 in. to 4 in., a negative pressure of about 2 in. (water gage) is maintained at the inlet end of the exhaust fan.

Recirculated quench gas is also drawn through a separate fan from the end of the cooling flues and returned to the quench tee at the cupola outlet. Since the inlet of the latter fan is operated at a negative pressure of 3 in., positive circulation in the quench circuit is assured.

The baghouse operates under a pressure of 3 to 4 in. and handles up to 4 cu ft of gas per square foot of bag area. The 11½ ft-dia, 15 ft-long bags are supported at the top on movable frames, which may be manually shaken to remove accumulated dust. The baghouse hopper is partitioned into four sections so that pressure can be shut off for the purpose of emptying part of the bags without halting smoke-abatement operations. As a rule, Alhambra Foundry does not empty the bags more than once a week.

Life Span of Bags More Than 2 Years

Lifespan of the silicone-impregnated glass fabric bags is variable, depending on the sort of handling they receive and the temperatures of gases reaching them over long periods of time. However, it is estimated that their average period of usefulness is well over 24 months.

Alhambra Foundry is a 35-year-old firm employing 46 workers on a four-acre plantsite which has 70,000 sq ft underroof. Diversified, yet standardized, castings for construction work are its principal products.

Average melting rate for the company is about eight tons per hour, and its cupola usually melts for two hours a day. A typical charge for the cupola comprises 79 per cent pig iron and 30 per cent scrap iron.

Even where greasy automobile scrap has been melted, company workers have reported no trouble due to tars or resin in the smoke collection equipment's baghouse.

Baghouse fans start when the blast is turned on, and stop after the bottom has been dropped. The plant superintendent checks the baghouse during routine inspection rounds, and no other operating labor is required.

Following the end of a given heat, about one man-hour per operational day is required to service the collection installation. This involves emptying cooling flues as well as baghouse hoppers, since all large particles in the foundry's smoke are deposited in the flues. Screw type conveyors facilitate emptying operations, and a normal weekly collection of solids weighs about 550 lb.

Some difficulties were initially experienced in keeping the cooling flues painted, since coatings thereon had to withstand operating temperatures exceeding 500 F. However, with relatively inexpensive mineral pitch coatings now being used, the flues do not have to be refinished more than twice a year.

Components that are not exposed to temperatures higher than 400 F can retain a mineral pitch finish about five years.

Conditions assumed in computing the cooling area required by the smoke collection equipment were as follows: Quantity of effluent from cupola, 7200 scfm; average temperature of cupola effluent, 1700 F; temperature of quench air, 350 F; temperature of gases at cooling flue inlet, 1100 F; temperature of gases at cooling flue outlet, 400 F.

Table I. Tests conducted by the Los Angeles Air Pollution Control District have shown that the smoke collector has consistently held effluent discharge to figures shown here.

Process Weight, Pounds per hour	Maximum Discharge Pounds per hour
100	.44
200	.83
500	1.73
1,000	2.80
2,000	4.23
5,000	7.33
10,000	12.00
20,000	24.00
40,000	48.00

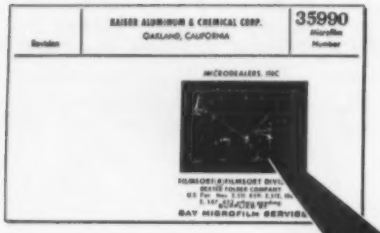
Heat transfer calculations included transfer inside the flues by convection and by inside radiation; outside the cooling pipes, by convection and by outside radiation. A summary of resultant data showed values ranging from 1.86 Btu per hr per sq ft per deg F down to 1.18 with an average of 1.52. Based on these conditions, this would give a required cooling area of 11,920 sq ft, under hypothetical conditions.

Direct cooling area provided for in the design amounted to 10,442 sq ft because it was obvious that the cupola cap and outlet, supporting structures, catwalks, and other components adjacent to the cooling flues would dissipate enough heat through conduction and radiation to make up for a difference of about 1500 sq ft.

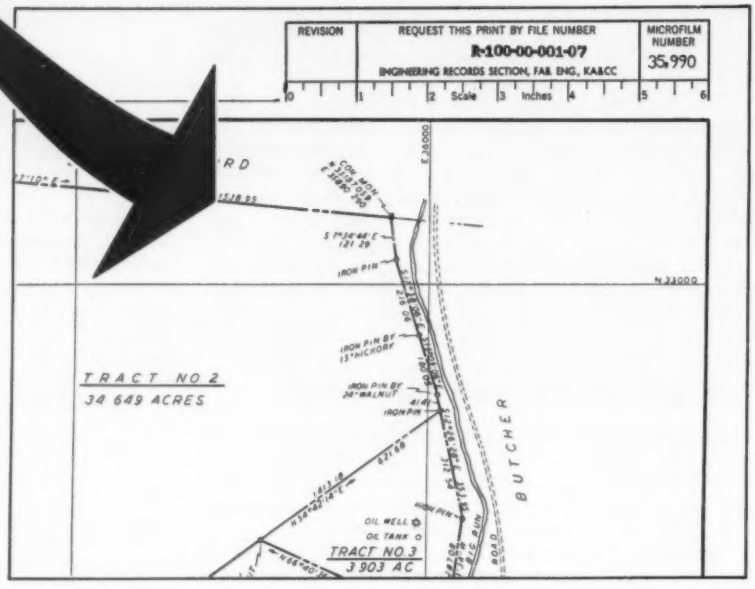
Tests conducted by the Los Angeles Air Pollution Control District have consistently shown that the equipment operates within limitations indicated by the table at the top of this page. **End**

Fig. 2. Workers shake accumulated dust from the bags. This operation is usually performed just once a week.

MICROFILM . . . An Engineering Tool



Mounted in 3 by 5 aperture cards, 35 mm negatives become a master file of engineering drawings



By J. W. PATTERSON
Administrative Assistant
Works Engineering Department
Kaiser Aluminum & Chemical Corp.
Ravenswood, West Virginia

MICROFILM, used as an engineering tool at the Ravenswood, West Virginia Works of Kaiser Aluminum & Chemical Corp., is overcoming many blueprint function problems. In addition, advantage is being taken of microfilming's obvious archival benefits.

After setting up the system at this $200 million aluminum reduction and fabrication facility—with the technical assistance of Hugh States, of Bay Microfilm Service, San Francisco—we can say:

"Microfilming has overcome the problems of classification, coding, indexing, standardization and constant revision of engineering drawings.

"The cost of the entire microfilming program is more than taken care of by eliminating the cost of purchasing flat files alone.

"Further, we find substantial savings are being made because the program utilizes microfilming as an engineering tool, not merely as a means for inactive record storage."

At the Ravenswood works, the problem involves the thousands of drawings necessary for the construction which has been underway.

Engineering drawings at the plant are of two types—those originated by Kaiser Aluminum's design department and those detailed drawings furnished by hundreds of different companies providing various pieces of equipment. One of the 14 rolling mills that are presently in operation or being installed, for example, may include as many as 5000 drawings from 40 different firms. The heavy volume of drawings has a wide size spread—from 8½ in. by 11 in. to 48 in. by 114 in.

A further complication is the requirement that three separate sets of files be maintained. Also present are the problems of accurate charge-out and the effort to issue only the latest revision.

Drawings are microfilmed after being properly identified, classified and indexed. The identification is stamped on a label attached to the drawing and becomes an integral part of the drawing.

A file number consists of a letter and four numerical components—R-000-00-000-00. The letter signifies the plant. The first group of numbers is the cost center; the second indicates the number of pieces of equipment in that cost center.

The next group of three numbers is designated the "component number" and is assembled in blocks of

About the Author

J. W. PATTERSON, administrative engineer at Ravenswood since April 1957, joined Kaiser in March 1956.

A former general manager of a Wisconsin construction company, he was an administrative engineer for Kaiser's Fabrication Engineering Department at Oakland, Calif. He is a graduate of the University of Minnesota, with a B.S. in architecture.

ten figures in the order of the flow of material through the equipment. Each piece of equipment is broken into assemblies and subassemblies, depending on the complexity of the unit.

The "component number" also indicates the trade involved—i.e. electrical, hydraulic, mechanical. For example, all electrical prints are coded in the 500 series, and all schematics are in the 510 series. Thus, if an electrical maintenance man needs a schematic of a unit on which he is working, the plate on the equipment tells him where to look in the files and the folder marked 510 shows him all the schematics for that unit.

The last two digits refer to an index detailing all the prints on file with a vendor's number. The digits indicate the number of prints in the particular component and are assigned in numerical order.

Through microfilming, the filing system places the prints of one piece of equipment in proximity to the equipment related to it.

Prints also are filed in accordance with the flow of material through the plant. Each machine or section of machine is filed in direct relation to the processes before and after, regardless of the type of size of the print.

Filed are the original microfilm, two duplicate negatives mounted in aperture cards, and standardized 11-in. by 17-in. reprints for reference.

Incorporated in the files are the cost center numbers used by the accounting department in coding the machine or process. Files, therefore, can be made available on a 24-hour basis even though clerical help is on an eight-hour day, because personnel requiring information from the files generally know the cost center number involved.

Standard Print Size

Uniformity of size is obtained by assuming the prints will fill an 11-in. by 17-in. area when enlarged, or in the case of a reduction that it fill the frame when reproduced on 11-in. by 17-in. paper.

We are getting acceptable results daily with 35 mm film. Our maximum print size limitation has been established at 34 in. by 44 in. The one per cent of the prints exceeding this size are filmed in sections and full sized reproducibles are kept on file.

The file is reproduced on 11-in. by 17-in. vellum by means of a continuous printer. The reproductions are then stored in upright jumbo file cabinets and the problem of size is solved.

Included in the identification label on the print is a six-inch rule which facilitates enlarging to full size in the darkroom, and when used in referring to reduced prints is helpful in adjusting to the scale.

All prints are reduced to 11-in. by 17-in. vellum prints for vertical filing.

All reference work is from copies. When an engineer wants a print, the copy on vellum is run through the white print machine. He uses the copy and the vellum is returned to the files. The white print is expendable at a cost of approximately 1.5 cents per copy; for this minor cost, we have eliminated any print check-out system.

A microfilm number system used for finding frames quickly on rolls of film eliminates the problem of refilming. These numbers are consecutive starting at 001 and continuing to infinity. Five hunderd frames are filmed to the roll.

Duplicate prints are made from the negative roll. These are mounted in aperture cards and filed in microfilm number sequences. These 3-in. by 5-in. cards are used for readers and for enlarging; the originals are kept in storage for safekeeping.

The use of the microfilm number also makes revisions almost foolproof. Because it is a sequential number, a revision with the same drawing number and file number has a larger microfilm number. A clerk filing a revised copy finds a copy already filed. All the selection needed is to file the copy with the largest number and destroy the old one. A record of the print prior to the revision is contained on the film copies and can be located by means of a microfilm number reference on the identification label.

Normally it is preferable to leave the reproduction of full-size repro-

(Continued on page 228)

For quick reference, 3-in. by 5-in. aperture cards are placed in Filmsort Surveyor for projection. Cabinets at left contain complete set of aperture cards.

TROUBLESHOOTING REVERSING CONTACTORS

Part II Pinpointing Circuit Failures

Finding trouble in a control circuit generally takes more time than required to make the actual repair. Substantial reductions in machine downtime can be realized by applying the systematic troubleshooting techniques described in this article.

By VERN KEMPF
Electrical Editor
Plant Engineering

TROUBLESHOOTING reversing contactor circuits naturally will be a little more difficult than the conventional motor starter. It will help to consider the two contactors in the reversing starter separately and check them out one by one. Most plants have electrically operated truck doors and this is the circuit, Fig. 15, that we will use as a troubleshooting guide.

As additional components have been added to the circuit, the physical wiring diagram has become more difficult to follow. This is not true of the schematic diagram where the addition of limit switches or interlock contacts as well as how they affect the circuit—can be observed with ease.

On any service call, the first thing to check is the fuses and the thermal overload elements. This is natural as these are the protective devices designed to protect the motor against short circuit and overloads.

With the cover of the motor control open, operate the safety latch so that the fused switch can be thrown to the "on" position. With a 480-v tester check the voltage from A to B, A to C, and B to C. These three readings should all show the line voltage and should be equal. If not, check above the fuses to make sure the line coming into the starter is satisfactory. If the line to line voltages above the fuses are not equal it will be necessary to trace the line back to the distribution panel and recheck at that point.

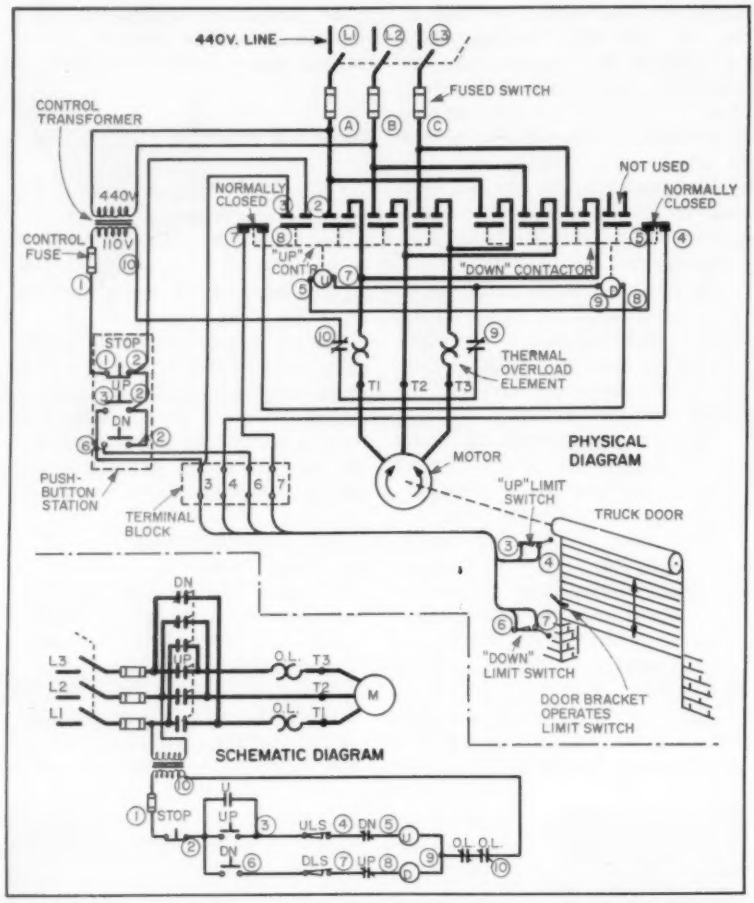


Fig. 15. Schematic diagram is used for circuit analysis to determine what components affect continuity. Testing is done on starter as shown in wiring diagram.

Assuming the motor fuses check out satisfactorily, the next step is to check the control fuse. Place the two test leads across line (1) and (10) at the control transformer. The voltage should read 110 volts in this case and no voltage would indicate a blown control fuse.

Checking the thermal overloads can be done by placing one lead of the tester on line (1) and the other lead on line (9). Look at the schematic diagram and you will see that this test is the same as testing across the transformer except the overloads are included in the circuit. If both overload contact elements are closed you will get a reading on the voltage tester.

If these preliminary tests check out perfectly it will be necessary to make additional tests to locate the source of trouble. In troubleshooting electrical circuits, it generally takes longer to find the trouble than to repair it. For this reason trouble-

shooting techniques should be fast and accurate and get down to the trouble spot rapidly.

Fast troubleshooting is accomplished by looking at the schematic diagram to follow the circuit through in a logical manner and simultaneously placing the tester on the selected spots in the starter to test the circuit. The numbers indicated on both the schematic drawing and the wiring diagram help to locate these test points.

Numbers are applied to the wire and to the terminal strips. Notice that all wires connected to a common point have the same number. The only time the number changes is when the circuit passes through a pushbutton, contact, coil, limit switch or other circuit device.

The wiring diagram and schematic drawing should be permanently mounted inside the starter enclosure cover for easy reference. The numbers on the drawing should correspond to the numbers on the wires to assure accurate troubleshooting.

One of the secrets of rapid troubleshooting is to take advantage of the test points available in the starter. This method saves a great deal of time as it is not necessary to open pushbutton or limit switch enclosures to test them individually.

As an example, here is a step-by-step method of checking the control circuit shown in Fig. 15. In Fig. 16-a we have shown just the control transformer and control fuse of the circuit. By placing our tester across wire #1 at the control fuse and wire #10 at the left hand overload relay contact, we can check the control transformer and the control fuse. A voltage indication tells us that both are working properly.

We have shown this circuit, Fig. 16, in schematic form so that it will be easy to see the next component in the circuit. In order to actually make this test in the field, you will have to place your tester across wires #1 and #10 in the starter. These wires can be located by finding them in the physical wiring diagram, Fig. 15. From here it is an easy step to locate these points in the actual starter.

Looking at the schematic drawing, we can see that the stop button can be checked by moving the left hand probe from wire #1 to wire #2. Checking the wiring diagram, we see that wire #2 terminates on the top side of the normally open auxiliary contact of the "up" contactor.

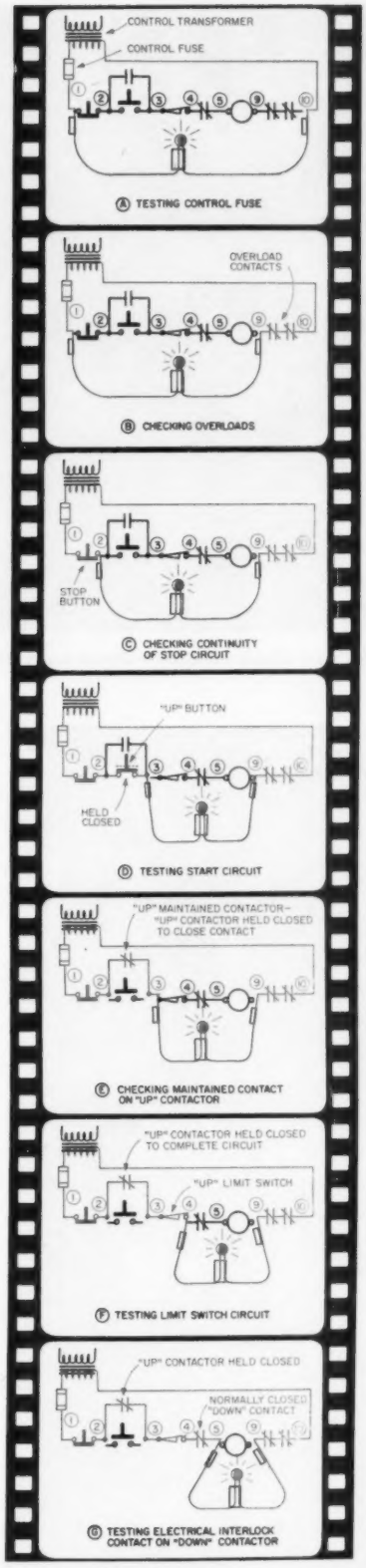

CONTROL TRANSFORMER
CONTROL FUSE
Ⓐ TESTING CONTROL FUSE
OVERLOAD CONTACTS
Ⓑ CHECKING OVERLOADS
STOP BUTTON
Ⓒ CHECKING CONTINUITY OF STOP CIRCUIT
"UP" BUTTON
HELD CLOSED
Ⓓ TESTING START CIRCUIT
"UP" MAINTAINED CONTACTOR—"UP" CONTACTOR HELD CLOSED TO CLOSE CONTACT
Ⓔ CHECKING MAINTAINED CONTACT ON "UP" CONTACTOR
"UP" CONTACTOR HELD CLOSED TO COMPLETE CIRCUIT
"UP" LIMIT SWITCH
Ⓕ TESTING LIMIT SWITCH CIRCUIT
"UP" CONTACTOR HELD CLOSED
NORMALLY CLOSED "DOWN" CONTACT
Ⓖ TESTING ELECTRICAL INTERLOCK CONTACT ON "DOWN" CONTACTOR

Fig. 16. Seven tests, performed in less than a minute, check possible faults in typical motor control system.

Testing wire #2 at this point in the starter will accomplish the same result as testing this connection in the stop button. You can save time with this procedure as it eliminates walking to the stop button and opening the enclosure to make the test.

If the stop button is closed, Fig. 16-c, the tester will indicate voltage. If a complete circuit is not indicated on the tester, the trouble is either in the "stop" button or in the wires leading to the "stop" button.

If the circuit has checked out satisfactorily up to this point, the next step is to check the "start" button. This is done by moving the test probe from wire #2 to wire #3, Fig. 16-d. The other lead of the tester remains on wire #9. In this test the "start" button must be depressed to complete the circuit. This can be done by clipping the test leads to the wires as shown and then walk over to the "start" button and press the button. If the circuit is performing properly the test light will go "on" when you hold the button down and go "off" when you release the button.

Testing the maintained contact, "up" limit switch and electrical interlock contact circuits proceeds in the same manner as shown in Fig. 16-e, f, and g. Notice that the "up" contactor must be closed by hand to complete these tests. Locate each of these test points in the wiring diagram, Fig. 15, so that you can find them in the starter.

If all the tests up to wire #5 and #9 indicate the proper voltage, we can see that full voltage is available across the "up" contactor coil. If the starter does not operate, this coil must be defective and should be replaced.

All these tests were made without opening any covers or disconnecting any wires. The only time it was necessary to leave the starter enclosure was to check the "start" button.

The "down" circuit is checked in the same manner. Have the operator hold the "down" pushbutton closed during the time you are checking from wire #9 to wires #6, 7, and 8. **End**

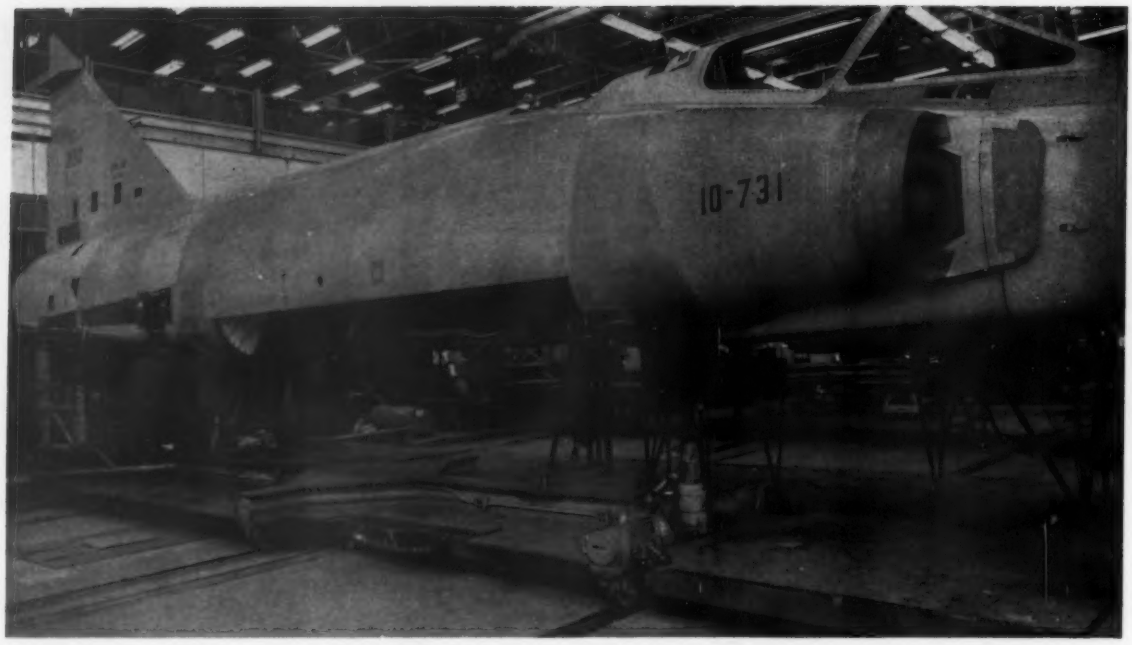


Fig. 1. Cradled plane rides on platforms which are chain-driven on channel iron rails. Note utility installations on platforms.

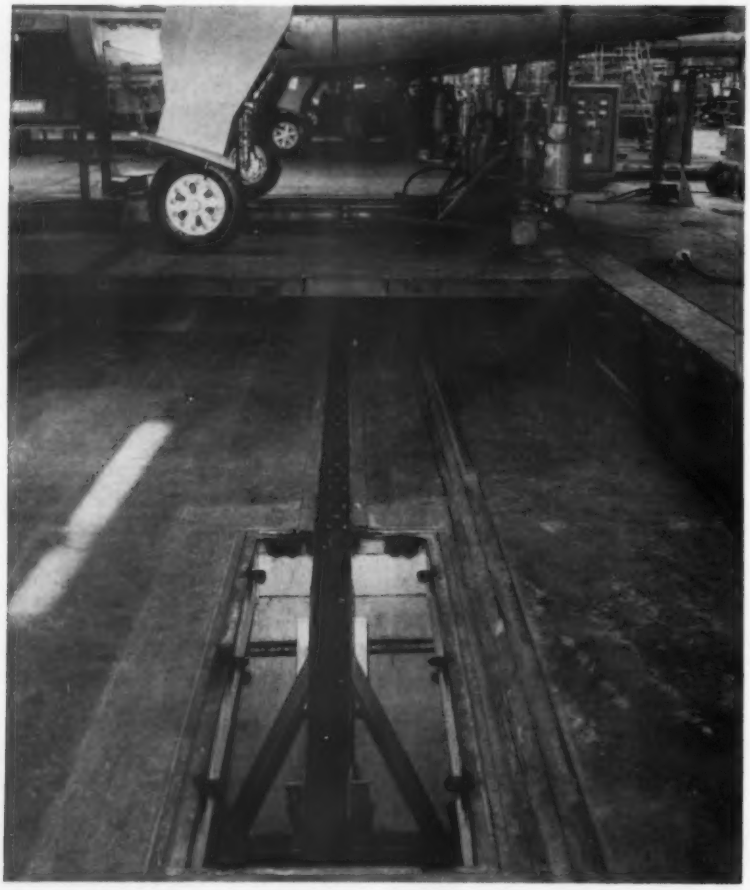


Fig. 2. Chain drive seen as it leaves power pit. Platforms are caster-mounted.

RIGHT PLACE,

AND NOW—jet aircraft continuously assembled on a moving production line, just like the family car.

Super-sized materials handling? Perhaps. Or perhaps it's as some claim: a new concept in materials handling . . . aircraft's first continuously moving, powered line (an earlier version used in some plants was neither powered nor continuous in the sense of "ever-moving"). Regardless, Convair's inauguration of the first continuous assembly line, for F-102 interceptors, ranks as among plant engineering's notable achievements.

Says plant manager P. G. Osborn, "The line, moving three to 35 ft per hour, coordinates all assembly jobs. Time is saved in materials handling. More important, the line helps to establish a 'standard' production schedule and, ever-moving as it is, assures that the schedule is maintained."

Both in practice and concept, Con-

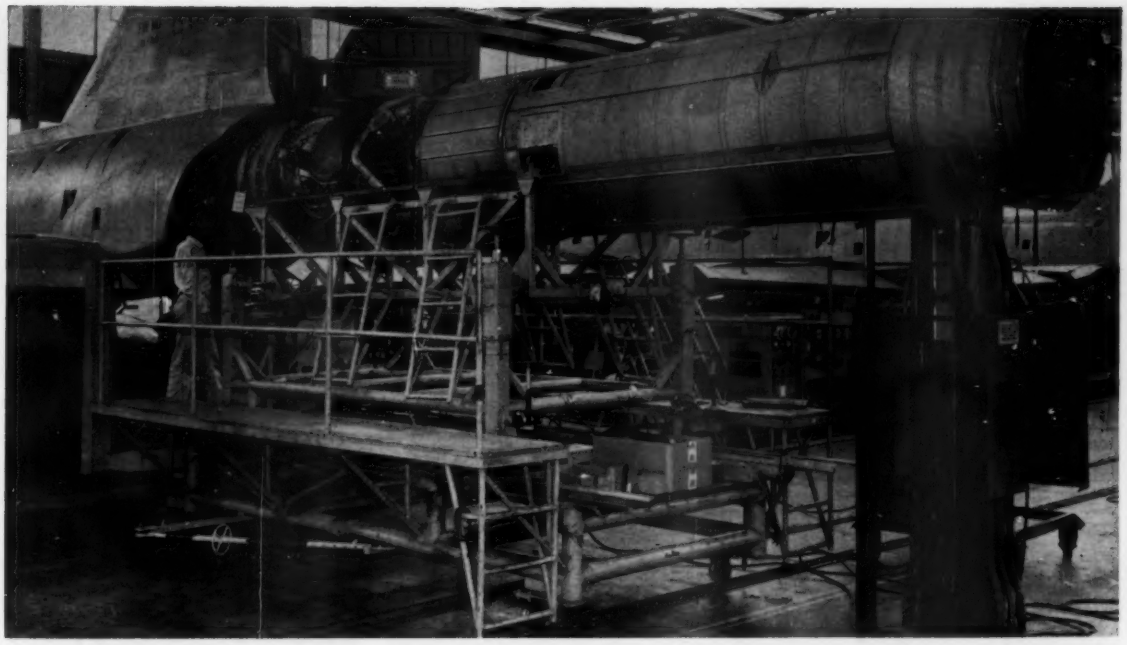


Fig. 3. Everything moves—engine (right) supported on moving cradle, is inserted into plane (left) also on moving cradle.

RIGHT PART, RIGHT WORKER

New MH Concept Brings 'em Together at Right Time

vair's assembly line is based on isochronous engineering—the synchronizing of time and place.

Automobile assembly is likewise based on isochronous engineering, as chassis, carried by conveyors, precisely meet sub-assemblies in an ever-moving line which ends with a finished car.

Yet isochronous engineering, as applied by Convair, is an almost complete reversal of the automotive concept.

And here's how: whereas in automotive assembly, cars move *to* assemblers, who remain stationary at their stations, at Convair the workers move *with* the planes they are assembling.

Thus, on Convair's continuous assembly line, recently put into operation at the company's San Diego Plant No. 2, men and machinery and planes move as a unit. Finally, fully assembled, an F-102 emerges from the assembly building, ready for fueling and flying. In all, 34 F-102s can be simultaneously assembled, upwards of 500 assemblers working the line.

The line was built and designed by Convair's plant engineering department.

U-Shaped Line

Built into the reinforced concrete floor of a major Convair building are two parallel assembly lines, connected at one end by a cross-over line. In effect, the assembly layout is U-shaped, its prime segments some 750 ft long and about 96 ft wide.

One of the two parallel lines is devoted to primary assembly. Here, planes get many of their innards. At the cross-over area they meet their wings. Then, moving up the second line—final assembly—their jet engines are installed, their systems tested and, finally, they exit, ready to fly.

Each assembly-line segment—whether primary or final—is really several lines. The main line carries the heavy-weight planes in steel cradles. Flanking the main line are upwards of three shuttle lines carrying a variety of assembly equipment—hydraulic testers, compressors and power tools.

Yet, regardless whether main or shuttle, each line, or complex of lines, is composed of track-mounted platforms decked in 1-in. plywood and finished with non-skid paint. Platforms are caster-mounted and ride on seven rails (2-in. by 2-in. angle irons embedded in concrete, their apex forming a triangular ridge which fits the V-grooved, 6-in. diam., heavy-duty steel casters). Typically, four to six casters are required per platform.

Platforms are hooked one to another like trolley cars. In fact, couplings are standard rail-car types, used to couple mining trains.

Depending upon production re-

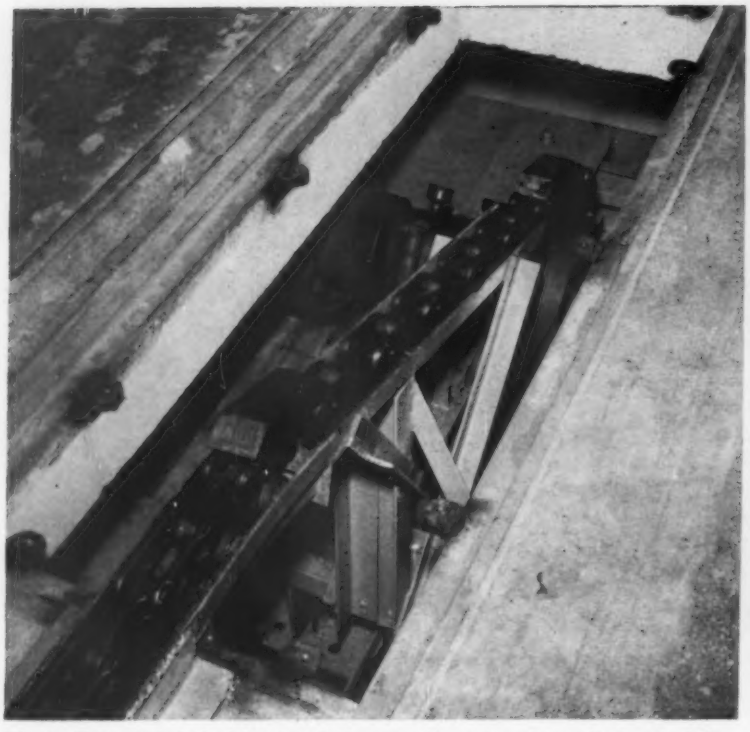


Fig. 4. Closeup of chain drive for platforms as it reenters drive pit at end of line.

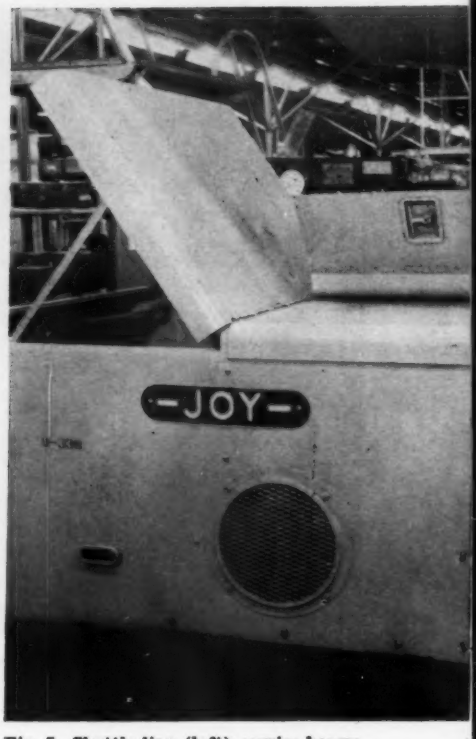


Fig. 5. Shuttle line (left) carries heavy

quirements, these lines move either continuously at rates from three to 35 ft an hour, or intermittently. And moving with them—actually on them—are the assemblers, as many as 500 skilled workmen.

The shuttle lines, however, may move only between three to six main line stations. The reason: the shuttle carries heavy-weight equipment which may be needed at only two or three adjacent prime line stations. Thus, having moved along with the prime line for several stations, it's shuttled back to its starting station, its equipment available for the next plane.

Shuttling accomplishes several things: 1. holds available heavy-duty equipment needed in assembly; and 2. allows the same piece of equipment, without duplication, to serve a number of stations.

But let's see how isochronous engineering plays its part.

A F-102 fuselage, resting in its steel cradle, is wheeled into the assembly building and set on a mobile platform. The platform is coupled into the line (hooked to the platform last in line).

From this moment, until the plane rolls off the line, the plane passes some 34 assembly stations—flanked by floor-mounted bins, stocked with parts and sub-assemblies needed at that particular juncture of the put-together.

Ever-moving, the planes proceed station-to-station. Simultaneously, the rail-mounted shuttle lines—flanking the main line on which the fuselage is cradled—also move. For these flanking lines must, at precise stages of assembly, be ready to supply assemblers with a wide variety of utilities including hydraulic pressure, air, and electrical power and also, with all types of specialized test equipment.

Utilities Move With Line

What we have, then, is an almost perfect synchronization of time and place. In a word, isochronous engineering.

When assemblers at station X, for example, need hydraulic pressure to test the F-102's newly installed control surfaces (say, rudder and elevans), the shuttle line has at hand a heavy-duty hydraulic unit.

Again, when compressed air is needed, the mobile supply line furnishes air from electric-driven, four-stage, air-cooled compressors (15 hp, 3500 psi, at some 15 scfm).

All the time, remember, the lines are moving, though slowly, and assemblers are actually riding with the planes they're working.

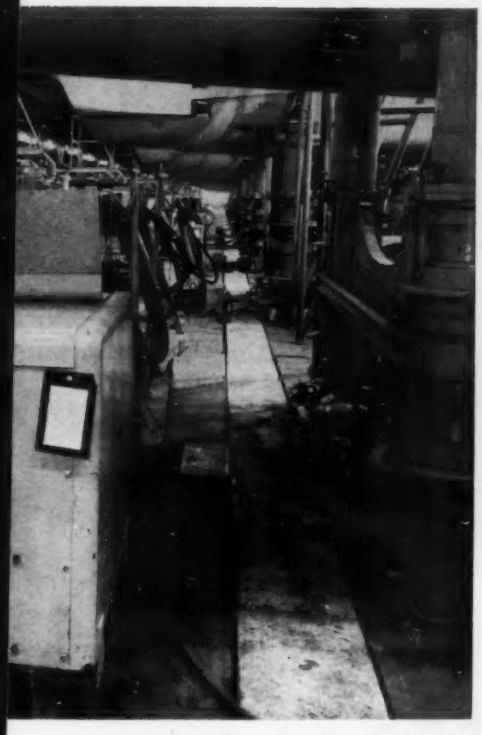
Involved is some complex engineering.

Power package: each prime line—primary and final assembly—has its own power package, installed under the floor.

Either of two electric motors (1½ hp and 15-hp) can power the line, driving a single 4-5/16-in. diam., high carbon steel shaft, fitted with three 700-lb sprockets. Motors drive the shaft through a gear reduction unit connected to the shaft by six driving chains. The shaft itself is nested in pillow blocks, the combine's drawbar total some 40,000-lb.

Sprockets drive short lengths of chain which are hooked to the end platform of each line. It's enough to drive but one platform since following platforms, coupled as they are, form what amounts to a train.

In installing line-drive chains, plant engineers disturbed only a small section of the existing floor slab.



equipment for main line seen right.

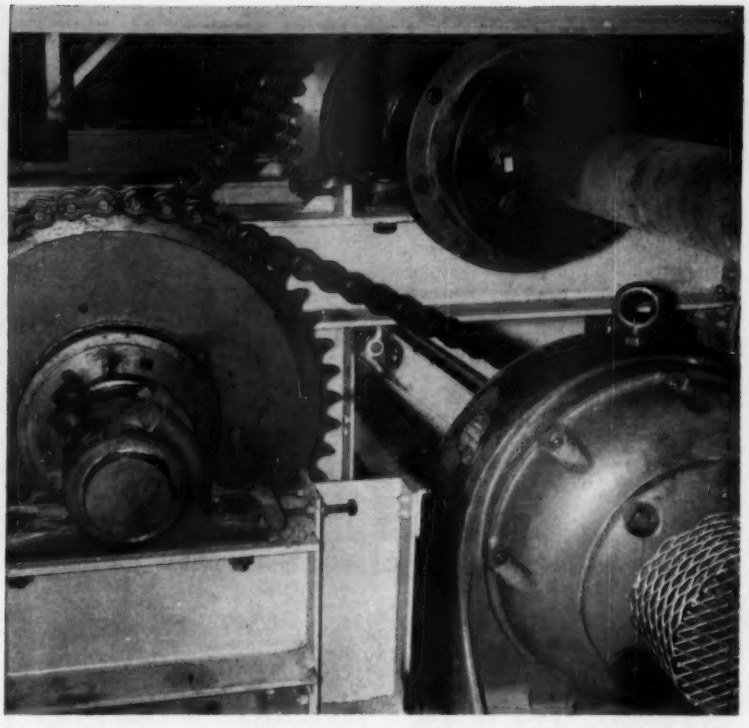
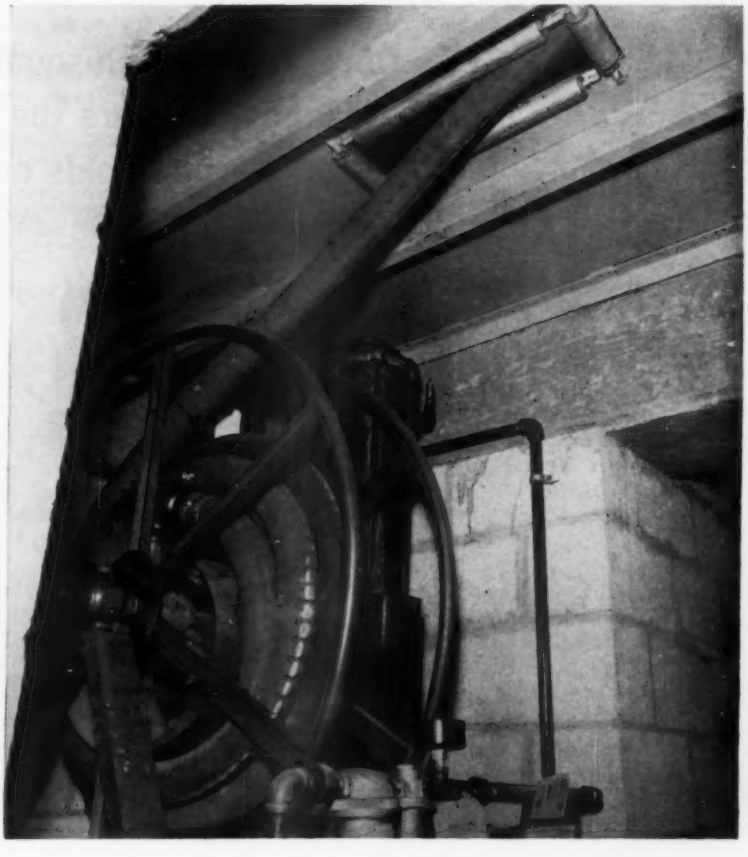


Fig. 6. Here is some of the underfloor equipment used to power the chain drive.

Fig. 7. Compressed air is supplied from underfloor pits. Note rollers around exit.



"It was," says mechanical engineer L. N. Aldrich, "a little like building a ship in a bottle. We dug a 7-ft by 7-ft hole in the floor where the motors, sprockets and drive shaft were installed. Then we tunneled under the floor making runways for the drive-chains which pass over and under the slab."

Line-drive chains are heat-treated steel with an ultimate strength of about 100,000 lb. Sprockets are about 30-in. diam. Excavation for the power units approximated 7 ft by 10 ft by 60 ft.

Each of the three line-drive chains powers but a single line. One, for example, drives the prime line. The remaining two power shuttle lines flanking the prime.

Even so, total loads are great. For example, the final assembly line's load approximates 500,000 lb, if fully loaded with 17 aircraft. Primary assembly line load is slightly less because on that line, planes as yet haven't received their engines, nor a number of other heavy components.

Speed control: a simple speed control regulates the lines' rate of movement. On "continuous" opera-

(Continued on page 228)

Some of the members of Corpus Christi Chapter appear in the photograph taken at one of the early meetings.

AIPE ADDS NEW CHAPTERS

Corpus Christi, Susquehanna and Oklahoma City are the newest chapters. Phoenix group holds organizational meeting

SEVERAL NEW chapters have been added to the long list of plant engineering groups that are now affiliated with the International Organization—The American Institute of Plant Engineers.

Corpus Christi, Susquehanna and Oklahoma City are the newest additions. The first organizational meeting of the Corpus Christi group was held the early part of last year. At this meeting, Bill Wallin, of Western Electric Co., and regional vice president of Region 5, and Dick Morris, the first president of the AIPE, assisted in answering questions about the AIPE. Later in the year the group was officially accepted as a chapter.

Members appearing in the photograph above are, left to right: W. E. Anderson, Delhi Taylor Oil Corp.; E. M. Reed, Reynolds Metals Co.; E. L. Orchard, Central Power and Light Co.; D. A. DeVries, Corn Products Co.; W. E. Bonifay, Halliburton Portland Cement Co.; B. R. Killen, Pontiac Refining Corp.; J. A. Williams, Reynolds Metals Co.; L. W. Plummer, Suntide Refining Co.; G. G. Litchfield, American Smelting and Refining Co.; J. W. Dudley, Sinclair Refining Co.; and O. D. Feland, Columbia Southern Chemical Corp.

Officers of the Corpus Christi Chapter are: J. A. Williams, Reynolds Metals Co., president; W. E. Bonifay, Halliburton Portland Cement Co., secretary; and D. G. Bond, Southwestern Oil & Refining Co., treasurer.

The Susquehanna group (York, Pa.) held their first meeting the latter part of last year. Seven plant engineers in the Susquehanna area attended this meeting. Their names are: H. Sullivan, Caterpillar Tractor Co.; C. Lefever, New York Wire Cloth Co.; R. Bond, S. Morgan Smith Co.; N. Rohrbaugh, Glatfelter Co.; R. Noel, York Div., Borg-Warner Corp.; W. E. Dreyton, American Chain and Cable Co.; and S. Oberdier, York Hoover Co.

Regional vice president Fred G. Fryberger, of Food Machinery and Chemical Co., Baltimore, Md., and past president John M. Waligora, of Merck, Sharp and Dohme, Philadelphia, Pa., attended the Susquehanna organizational meeting and helped them set up a constitution which is in agreement with AIPE requirements.

The Susquehanna group was of-

ficially accepted as a chapter of the AIPE in January of this year and presented with their chapter charter by president-elect Bill Wallin.

Officers of the Susquehanna group are: H. Sullivan, president; C. Lefever, vice president; R. Bond, secretary; and N. Rohrbaugh, treasurer.

Oklahoma City was the most recent chapter to join the AIPE. Their organizational meeting, called by D. K. Andrews, Jr., of Hudgins, Thompson, Ball and Associates, was held on March 5. W. C. Wallin, of Western Electric Co., AIPE regional vice president and president-elect, attended the meeting to discuss the purposes of the AIPE and to assist in the chapter formation.

The new chapter, with 24 charter members, elected the following temporary officers: D. K. Andrews, Jr., president; J. W. Gregory, Jr., Federal Aviation Agency, vice president; and E. O. Kirk, Baptist Memorial Hospital, secretary-treasurer.

President Howard Sullivan of newly-organized Susquehanna Chapter, second from left, receives charter from Bill Wallin, president-elect of AIPE. Other officers are, left to right: C. Lefever, vice president; R. Bond, secretary; F. Fryberger, international secretary-elect, AIPE; and N. Rohrbaugh, treasurer.

Report on Phoenix Meeting

Plant engineers in the Phoenix area held an organizational meeting in February to discuss the formation of a chapter in this area and possible affiliation with the AIPE. Regional vice president C. A. Gallaher, of Robertshaw-Fulton Controls Co., Anaheim, Calif., was on hand for this first meeting to help organize the group and answer any questions regarding the AIPE.

Plant engineers attending this meeting and appearing in the picture at the bottom of this page are:

Seated, left to right: J. Rice, International Metal Products Corp.; A. E. Swindler, Goodyear Aircraft Co.; R. L. Cummins, General Electric Co.; and C. Gort, Sperry Phoenix Co.

Standing, left to right: C. A. Gallaher, Robertshaw-Fulton Controls Co. (regional vice president, Region 1); L. Nielson, AiResearch Manufacturing Co. of Phoenix; D. H. Cravener, Jr., Reynolds Metals Co.; and J. Thomas, Motorola Semi-Conductor Division. **End**

In February, plant engineers held a meeting in Phoenix, Arizona, to discuss Chapter formation and AIPE affiliation.

NEW!

ROME *TRIMLINE** PRIMARY DISTRIBUTION SYSTEM

WITH A NEW SIMPLIFIED, STREAMLINED SPACER DESIGN!

A Practical Overhead System. Developed for utility and industrial distribution circuits ranging from 5 to 15 kv, Rome's TRIMLINE* system consists of (1) a unique and highly simplified Plexiglas supporting spacer, (2) extruded black, high molecular weight polyethylene insulated phase conductors (either one, two, or three phase), and (3) a high strength supporting messenger.

This economical method of overhead distribution is recommended for installations where:

- additional circuits are required on a pole
- poles are too crowded
- bad tree and storm conditions cause havoc with open-wire lines
- alleyways prohibit use of crossarms

. . . and especially where a *compact* and *neat-appearing* distribution system is necessary!

System Features New Spacer. Now . . . a new spacer design makes Rome's TRIMLINE* system as reliable as it is practical. The one-piece Plexiglas spacer offers distinct "reliability" features. It has no mating or matching surfaces to form cracks or crevices which collect water or other contaminants. This in turn reduces the possibility of eventual arcing or shorting.

Each spacer is equipped with four "snap-lok" neoprene grommets (adapters). Special molded-in compression rings in each grommet assure a snug spacer-to-cable fit. The constant pressure exerted upon the messenger and conductors restricts the spacer from "traveling" on the line.

The spacer itself is shaped like a diamond with rounded corners and smooth edges. When installed, each of the phase conductors and the messenger are completely contained within the encompassing spacer unit.

Installation of the spacer unit is performed with no tools or special equipment, requires *no* nuts or bolts. And maintenance is just as easy—phase conductors can be removed or added without removing the spacer from the messenger. Spacers are placed approximately thirty feet apart along the entire length of the distribution system.

*T. M. (patent applied for)

HERE'S WHAT THE TRIMLINE SYSTEM OFFERS YOU:

1. A *single* spacer for 5 to 15 kv range.
2. Abrasion-resistant high molecular weight polyethylene insulation or other suitable materials as specified by the user.
3. Neoprene grommets with molded-in compression rings.
4. A spacer that completely encloses phase conductors and messenger.
5. A high strength supporting messenger that provides storm damage protection, thereby permitting . . .
6. Longer spans—the system messenger permits spans up to 300 feet.
7. Positive phase identification by position in spacer.
8. Lower reactance than conventional open-wire lines.
9. Ease of installation.
10. Neat, compact overhead distribution. Better public relations.

Send in the coupon for our new bulletin on Rome TRIMLINE* Primary Distribution System.

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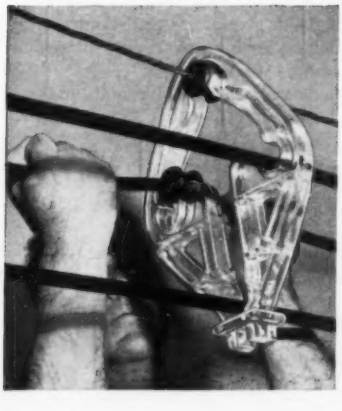

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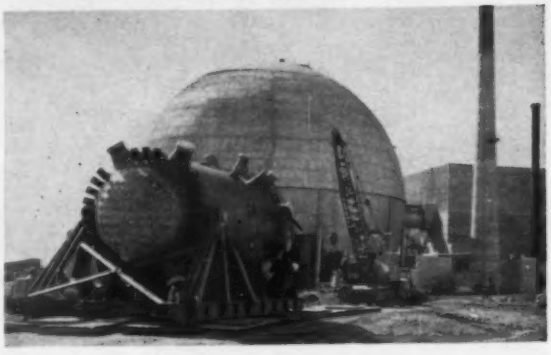
For more facts circle 567 on Reply Card

Nuclear Reactor Vessel, 300 Tons of Precision, Installed in Sphere

WEIGHING IN AT a respectable 300 tons, the largest nuclear power reactor ever built is now being installed at Commonwealth Edison's Dresden Nuclear Power Station near Morris, Illinois.

The reactor vessel is 42 ft high and 12 ft in diameter. Its walls are 5½ thick, consisting of low carbon steel with ⅜-in. interior stainless steel lining. Built by the New York Shipbuilding Corp., the massive reactor was shipped by barge from Camden, N. J., over a circuitous 3600-mile route. At the site, it was "dragged" through a hole cut into the side of the 190-ft sphere which will house the nuclear components of the power generating facility. Inside the sphere, the reactor was tilted to its vertical operating position.



Dresden Station is expected to be ready for regular service in mid-1960. General Electric Co., is building the plant for Commonwealth Edison Company, who are paying 30 million dollars of the total 45 million price tag.

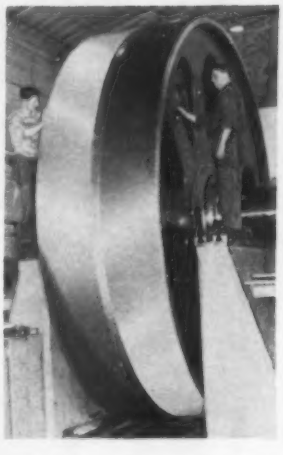
Co-sponsors of the development group, primarily power companies of the midwestern states, are paying the 15 million dollar balance of the cost, as a research and development expense.

Parts Produced for Two Atomic-Powered Ships – One Commercial, One Military

DESIGNED to drive the world's first atomic-powered merchant ship, a 70,000-lb bull gear has been completed at the De Laval Steam Turbine Co. plant in Trenton, N. J.

This main drive gear measures 176 in. in diameter and 48 in. across the gear face—the herringbone pattern which is made up of 583 gear teeth.

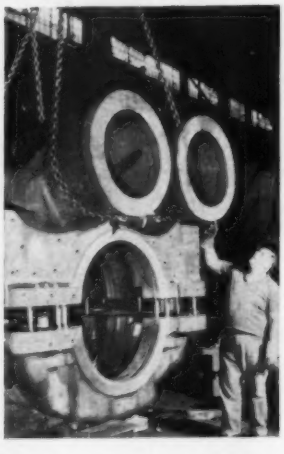
Steam produced in an atomic reactor will drive a De Laval turbine, which will spin the big bull gear. Launching date of the ship is set for late 1959.



PORTIONS of the first of two main propulsion turbines for installation in the Navy's nuclear-powered guided missile cruiser are in production at General Electric's Medium Steam Turbine, Generator and Gear Dept., Lynn, Mass.

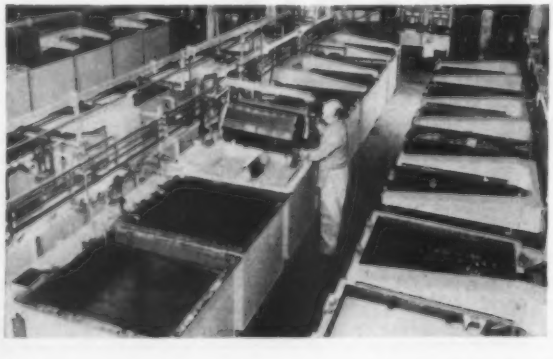
Nuclear reactors aboard the USS Long Beach will generate steam which will flow to a heat exchanger. Steam will in turn be produced in the heat exchanger and be piped to the propulsion turbines.

The ship will fire missiles of nuclear capability.



Plating Facility Permits Volume Operation in High-Temperature Coating Applications

A SEPARATE HIGH-TEMPERATURE plating facility—costing in excess of $100,000, has been put in operation by Standard Pressed Steel Co., Jenkintown, Pa. The new unit will apply diffused nickel-cadmium, nickel, copper and silver coatings of a type used on parts for temperatures up to 1400 F.



Offering great flexibility, the new facility consists of a 52-ft barrel line and a 52-ft rack line for nickel-cadmium operations and duplicate facilities for silver. Both nickel-cadmium and silver lines are arranged in a 3000-sq ft area with special acid-proof brick flooring. Major features on the lines include central panel grouping of all controls; special design rectifiers which make high-reliability plating a routine matter, and continuous filtering units.

Individual rinse tanks between each plating and wash tank, plastic-lined plating tanks, and special valves which control heated tanks to within plus or minus 2½ deg of correct temperature setting are provided. For waste water collection, a trough separates contaminated from clear water, sending only contaminated water to waste treatment. Clear water goes to a lagoon for reuse.

Total new nickel-cadmium capacity of more than 350 lb of work per hour allows SPS to handle high-temperature coating application on a volume basis for the first time. Laminations resulting from interruptions of the plating cycle to check progress of the work have been eliminated, as has poor adhesion.

For more facts circle 568 on Reply Card →

No trouble calls with PUSHMATIC

Every breaker is individually performance tested

Browse along our production line and it will be apparent why this circuit breaker has earned the reputation as the *safest and most dependable* on the market. Following are five of the dozen or more exhaustive checks and quality controls the Pushmatics undergo — over and beyond those required by Underwriters'.

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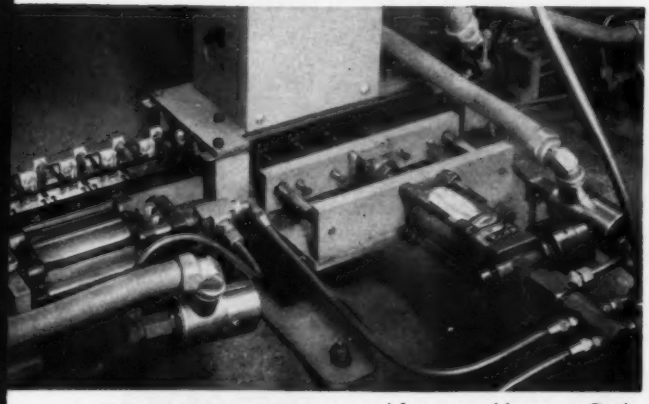
I-T-E CIRCUIT BREAKER COMPANY
BOX 177 • DETROIT 32, MICHIGAN

In Canada: 80 Clayson Rd., Toronto 15, Ont. Export Division: 13 East 40th St., New York 16, N.Y.

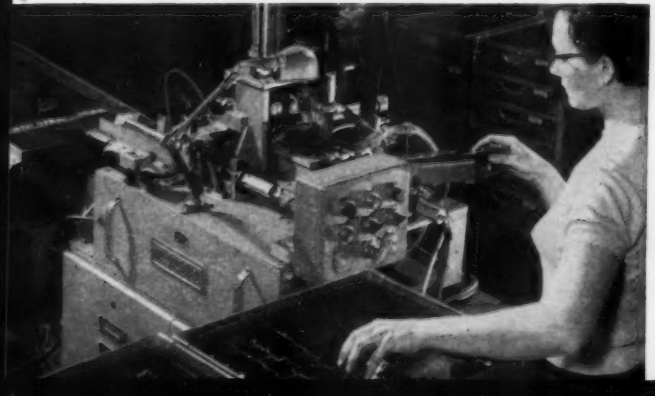
1. CALIBRATION In a dust-free room, where temperature is maintained at a constant 75°, operators calibrate *every* Pushmatic bi-metal assembly on a special optical viewer. Each bi-metal "latch" is adjusted to a dimensional accuracy of 1/1000 of an inch. Prior to this, the bi-metal had been heat-treated in an inert atmosphere to relieve stresses, "normalize" the metal.



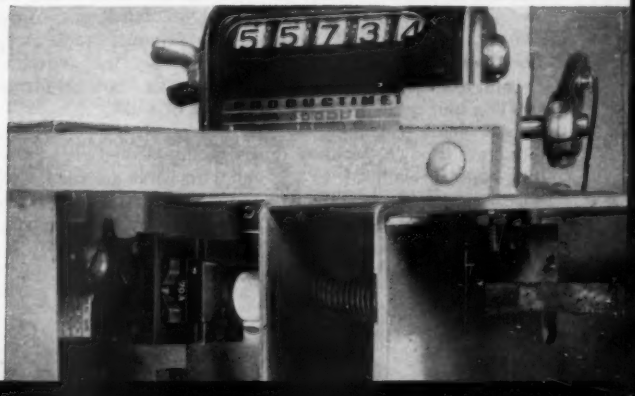
2. MECHANICAL BREAK-IN After assembly every Pushmatic is operated 50 times to make absolutely sure it functions well mechanically. Ten break-ins would be adequate . . . the extra 40 give you that much more assurance that it will never fail in manual or automatic operation.

3. CALIBRATION UNDER LOAD Brought back to its "set" temperature, each breaker is checked at 200% of rated current, and again at the equivalent of 125% of rating. Check Boards are accurate to 1/10 of a second. Samples from each production run are also tested at 100% of rating.

4. SHORT CIRCUIT TEST Being thermal-magnetic devices, Pushmatics then undergo severe short circuit currents to test the instantaneous trip time of the magnetic element. If a breaker fails to trip within .02 seconds, it is automatically rejected by the machine. Extra safety, extra performance.



5. ENDURANCE TEST Underwriters' Laboratories run periodic endurance tests on BullDog Pushmatics®. The requirement — 10,000 operations, 6000 under load and 4000 with no load. But BullDog constantly checks out the breakers at 50,000 or more operations. *End trouble calls. Use Pushmatic!*



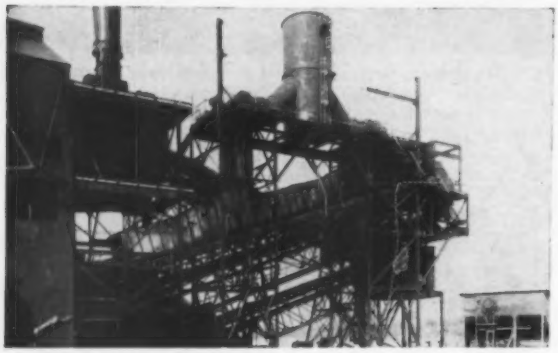
Sintering Plant Featuring Straight-Line Cooling Makes U.S. Entry

FACILITIES FOR the daily production of 2100 tons of self-fluxing sinter for blast furnace charging have been placed in operation at the Trenton (Michigan) Works of McLouth Steel Corporation.

Engineered and built by Dravo Corp., Pittsburgh, the plant went into full production only two weeks after the start of pilot operations. It produces sinter for use at McLouth Steel's two blast furnaces at Trenton.

Constructed by Dravo under a licensing agreement with the Lurgi Company of Germany, the installation is the first Dravo-Lurgi plant in this country featuring a straight-line, induced draft cooler for the sinter product.

The sintering facility, built primarily to agglomerate Lake Superior ore fines too small to be charged directly into the blast furnaces, is also being used to reclaim a five-year accumulation of flue dust containing a high iron content. This flue dust stockpile, once considered of little value, is estimated to contain 300,000 tons.



Heart of the sinter plant is a continuous sinter machine consisting of 77 cast iron pallets. It measures 111½ ft over-all with a length over its 13 windboxes of 84½ ft. With a width of 8¼ ft, it has a suction area of about 700 sq ft. Speed of the strand may be regulated from 6½ ft to 17 ft per minute.

The cooler, about 137 ft long, with a capacity of 2500 tons per hour, lowers the temperature of the sintered material from about 1450F to approximately 235F; a heat level at which the material may be carried by rubber belt conveyors without belt damage.

Supplying fines and miscellaneous materials—coke, flue dust, limestone and mill scale—to the sinter strand is an intricate system of hoppers, conveyor belts, vibrating feeders, table feeders, vibrating screens, plus such processing equipment as pug mills, rod mills, balling drums, and sinter dust collectors.

Hot sinter is transferred by vibrating feeder to the straight line cooler, where it is deposited on an inclined pan conveyor consisting of 69 trays, 9 ft wide.

The trays are mounted on a continuous chain stretching between drive and idler sprockets. Each tray has a pair of cast iron wheels near the trailing edge, and at the leading edge is supported by the trailing edge of the tray ahead of it in the strand.

The cooler is equipped with two 200,000 cfm fans, driven by 150-hp motors. Of the axial flow type, the fans discharge into a comon stack.

Welding Boom Noses Into Tanks, Operator Rides Along

NOW IN OPERATION on the site of the Hunterston nuclear power station in Scotland, a complete automatic welding installation is being used in the fabrication of sixteen heat exchanger vessels. These vessels, cylindrical pressure-tight containers, when erected will be 73 ft, 6 in. in diameter, and will weigh over 200 tons.

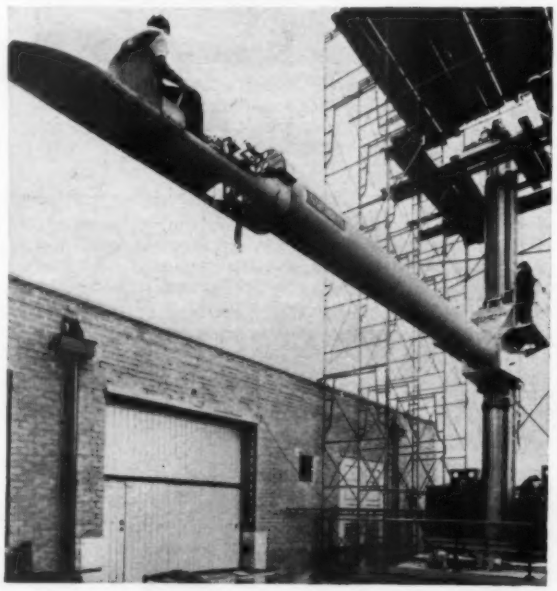
The power station is being built by General Electric Co., in association with Simon-Carves Ltd., the Motherwell Bridge and Engineering Co., Ltd., and Mowlems (Scotland) Ltd. The welding equipment was supplied by Quasi-Arc Ltd.

Each vessel is built up from six strakes, plus a top and bottom head and a supporting skirt. All welds on internal and external seams, longitudinal as well as circumferential, are being done automatically.

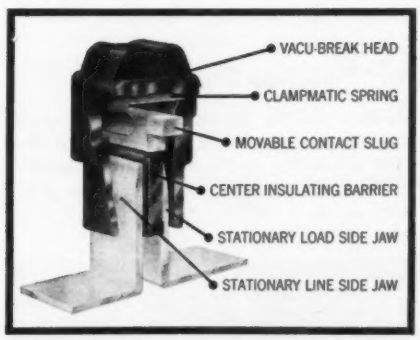
Longitudinal seams in the strakes are first welded with a traversing and swiveling welding boom, the largest of its kind in the world, with each strake being supported on a 40-ton capacity roller bed. The strakes then pass, via turntable, to another set of rails for circumferential welding. For this purpose, a second welding boom, somewhat smaller, is used, running on a separate track along the roller bed track. At the same time, the swiveling boom, running on the roller bed tracks, can be turned 90 deg and used over the second set of rails.

All welding is done by the Unionmelt process, using four multi-power welding heads mounted on two traversing booms, two heads to a boom. Two wires are used, each operating independently with its own power source, feed motor, voltage control and nozzle assembly. Both wires are fed into a common weld pool.

Welding speed traverse on the booms is controllable between six and 60 in. per minute, with high-speed traverse of 20 ft per minute for positioning. Welding controls are provided at the welding head itself, governing all functions of the boom and the roller beds.



Compact central power control—*with Vacu-Break protection*



VACU-BREAK CONTROL snuffs arcs immediately when breaking circuits under load. The enclosed head limits the oxygen available during the brief arcing period. Closeness of the head material causes the arc to cool and extinguish quickly. "Double-break" action reduces the distance the Vacu-Break head must travel before the arc is extinguished. In addition, Clampmatic action assures bolt-tight contacts, accelerates breaks.

BullDog Vacu-Break® Power Panels provide the efficient, economical way to centralize lighting and power distribution. One compact panel controls a host of lights and motors . . . saves space . . . provides real circuit flexibility.

BullDog Power Panels are prefabricated . . . switch units are quick-make, quick-break, standardized and interchangeable. Units are available from 30 to 600 amperes. It is simplicity itself to convert the panels when circuit requirements change.

Exclusive Vacu-Break control snuffs arcs quickly . . . Clampmatic® action assures bolt-tight switching connections—longer equipment life. For safety's sake—and superior performance—specify BullDog Vacu-Break Power Panels.

BULLDOG ELECTRIC PRODUCTS DIVISION
I-T-E CIRCUIT BREAKER COMPANY
BOX 177 • DETROIT 32, MICHIGAN

® In Canada: 80 Clayson Rd., Toronto 15, Ont. Export Division: 13 East 40th St., New York 16, N.Y.

For more facts circle 569 on Reply Card

Versatile Hydrostatic Machine Tests Pipe up to 15,000 Psi

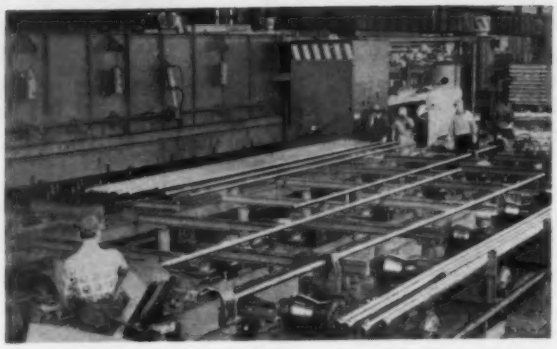
FACILITIES FOR TESTING of steel pipe at internal pressures up to 15,000 psi have been installed at the Ambridge plant, Tubular Division of the National Supply Co.

The installation includes equipment for blowing out scale and dirt, stenciling required information on the pipe, screwing on couplings, delivering pipe to the tester, hydrostatically testing it, weighing it after testing, screwing on thread protectors, and spraying each length with oil.

Pipe ranging from 2⅜ to 5½ in. in outside diameter can be handled, in lengths from 16 to 48 ft, including plain end, threaded, coupled, and upset pipe.

At the test line, the pipe is picked up from skids, and placed on the loading table. Air is blown through each length to remove any scale and also to blow dirt, oil, etc., from the threads. The pipe is then rolled to the automatic stencil machine, where an aluminum stencil nine feet long is positioned against it for painting. In the next position, couplings are greased and screwed on hand-tight, then power-tightened as designated.

Aligned automatically, the pipe is rolled on to the testing bench and held firmly in clamping mechanisms while

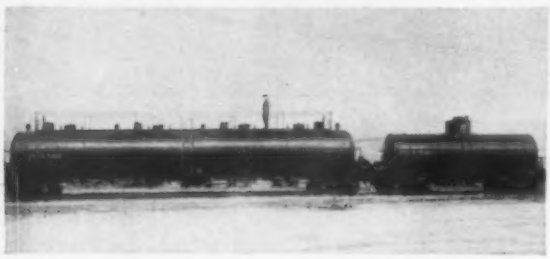


water is pumped into each piece to the desired pressure. As each test is completed, the pipe is tilted to drain the water, after which it is weighed and the weight recorded. Thread protectors are then applied, and the pipe is coated with oil. It is then ready for shipping or storage.

Tank Car of "Hot Dog" Design Has Double Capacity of Conventional Cars

THE FOUR LARGEST railway tank cars in the world have been built by Union Tank Car Co. for lease to the Pennzoil Div. of South Penn Oil Co., Oil City, Pa.

With a capacity of 21,800 gallons, twice the load limit of most present-day cars, these "Hot Dog" cars offer time and labor savings in loading and unloading, paper work and car handling. Each will serve shippers where two, or even four, cars would otherwise be required.



Constructed at Whiting, Indiana, the cars are 67½ ft long, 14 ft, 8 in. high and weigh 92,300 lb empty. The tanks themselves, which have four compartments of 5450 gal capacity each, were fabricated by Graver Tank & Mfg. Co., a division of Union Tank.

Each car has a much smaller dome than conventional cars, and the Hot Dog design eliminated the customary underframe by welding the tank directly to the wheel trucks.

The first four cars will be used by Pennzoil to carry lubricating oils from its Rouseville, Pa. refineries and its St. Louis, Mo. storage and distribution facilities.

Automatic Processing Line Draws, Straightens, Cuts and Polishes Steel Bars

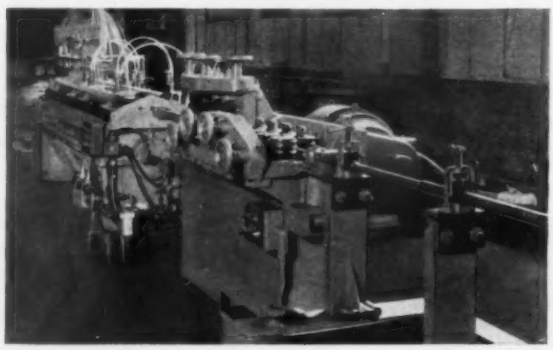
COMPLETELY AUTOMATIC, a high-speed machine for continuous cold drawing, straightening, cutting and polishing of bars from coiled rod is now in production. The line is capable of turning out cold finished rounds, squares, hexagons and rectangular sections in sizes from 3/16 in. to 5/8 in. at a line speed of 200 ft per minute.

Designed and built by Loma Machine Mfg. Co., Inc., New York, the line comprises an uncoiler, a pre-straightener, a drawbench, a roller straightener, a flying cutoff, a polishing machine and a discharge table.

From the uncoiler, the rod is inserted into the five-roll pre-straightener which removes the coil bend and eliminates kinks. Leaving the pre-straightener, the stock is pulled through the tungsten carbide die on the drawbench by the back-and-forth movements of two carriages with built-in jaws effecting a reciprocating movement.

The rod emerging from the drawbench passes through a vertical and horizontal set of straightening rollers mounted in tandem. Each roller straightener comprises eight rollers, four of which are positively driven through gearing, by a common motor.

The rod is cut into lengths ranging from eight to 25 ft, by a flying shear traveling in the direction of and at the speed of the advancing stock. After cutoff, square, hexagonal and rectangular stock is discharged into piling racks, while round stock is further processed in a combined straightening and polishing machine.



MORE OF THE GARLOCK 2,000

Garlock Metal Packings (above) prevent escape of air or gas from compressors. Sets are supplied with segmental packing rings (right) super-finished to 15 micro-inches or less for better sealing.

Seal air and gas compressors this proven way... with Garlock Metal Packings

Every metal packing set that leaves the Garlock factory must meet the following rugged standards:

1. Gas tight seal between packing rings and compressor rod.
2. Gas tight seal between packing rings and packing groove.
3. Packing must not be affected by operating conditions.
4. Operating conditions must not be affected by packing.
5. Packing must have no adverse effect on compressor rod.

Get these fine features by specifying Garlock metal packings. Choose from many different styles and materials. Whichever you select, you can be sure of the finest metal packing available for air and gas compressor service.

Metal packings and oil scraper rings are more of the Garlock 2,000 . . . two thousand different styles of packings, gaskets, and seals for every need. Assure yourself of the proper application by discussing it with your local Garlock representative. Call him, or write

THE GARLOCK PACKING COMPANY, Palmyra, N.Y.

For Prompt Service, contact one of our 30 sales offices and warehouses throughout the U. S. and Canada.

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Packings, Gaskets, Oil Seals, Mechanical Seals, Molded and Extruded Rubber, Plastic Products

Canadian Division: The Garlock Packing Co. of Canada Ltd. Plastics Division: United States Gasket Company

For more facts circle 570 on Reply Card

NEW PLANT CONSTRUCTION —advance information on location, costs

Gilroy, Calif.—The Gentry Division of the Consolidated Food Corp., 135 S. La Salle St., Chicago, Ill., has announced start of construction of a large addition to company plant located here engaged in the production of dehydrated garlic and onions. New facility will cost about $275,000. Work is already under way and is scheduled for completion late in 1959.

Los Angeles, Calif.—Catalina, Inc. plans to construct a plant and administrative headquarters here. New facility will be of concrete and steel construction and will cost about $2 million. Work will begin at once for completion by late 1960.

Los Angeles, Calif.—Hoffman Electronics Corp. plans construction of an electronics plant near here. New plant, reported to represent an investment of $1.5 million, will double the company's semi-conductor production capacity. Construction of the 109,000-sq ft facility will begin immediately and is scheduled for completion by 1960.

Los Angeles, Calif.—National Container Corp. of California, a subsidiary of Owens-Illinois Glass Co., Ohio Building, Toledo, O., plans to construct a major addition to company's plant located here. Plans include construction of a 169,000-sq ft addition which will more than double the present production capacity of the facility. Construction will get under way at once for completion late this year. Cost of the new addition reported to be in excess of $3 million.

Newark, Del.—Continental - Diamond Fibre Co., subsidiary of the Haveg Corp., Marshallton, Del., plans to construct a research laboratory at company's plant located here. Company has awarded a contract in the amount of $1 million to the Gilmore-Olson Co., 1873 E. 55th St., Cleveland, O., to design and construct the new facility.

Chicago, Ill.—Libby, McNeill & Libby plans a capital expenditure of $50 million over a five year period, including a new meat packing plant and can-making facilities on a 55-acre building site on Chicago's south side. Ground for the $10.5-million plant has already been broken and is scheduled for completion late in 1960.

Moline, Ill.—Deere & Co., 1325 Third Ave., Moline, Ill., plans a large addition to company's John Deere Malleable Iron Works, located in East Moline. Plant addition will cost about $2.8 million. Work will get under way at once for completion by early 1961.

Peoria, Ill.—Hiram Walker & Sons, Inc. plans to construct an air-conditioned rack warehouse at company distillery located here. Work is scheduled to begin at once for completion by early 1960.

New Orleans, La. — Owens-Illinois Glass Co., Ohio Building, Toledo, O., plans to construct a multi-furnace glass container plant on a 24-acre site recently acquired in this city. The new plant will cover 150,000 sq ft and will be one of the most highly automated glass container plants in the world.

Baltimore, Md.—Armco Steel Corp., 1939 Armco Ave., Middletown, O., plans a major expansion of company's stainless steel output at company works located here. The expansion, to get under way at once, will include two double-ingot heating furnaces and three new heat-treating furnaces. Work is scheduled to be completed by the end of this year at a cost of $775,000.

Dearborn, Mich.—Ford Motor Co., 3000 Schaefer Rd., plans to spend more than $35 million to improve company's steel-making facilities at local plant here. Construction program will get under way as soon as preliminary engineering work is completed. Included in the project is a 75,000-sq ft building extension to be added to company's cold rolling mill. Also planned are new facilities and operational changes in all of the steel making facilities to increase production.

Detroit, Mich.—L. A. Young Spring & Wire Corp., 9240 Russell St., plans a major expansion, improvement and modernization program of the firm's auto parts plants. Included in the program are plans for an addition and modernization of company plants in the Chicago area and construction of a new plant in the St. Louis, Mo., area. The new plant will cost $3 million.

Hoyt Lakes, Minn.—Erie Mining Company, Sellwood Building, Duluth, Minn., plans an addition of two pelletizing furnace units to company's taconite pelletizing plant located here. Construction and installation of the new facilities will begin early this summer for completion by late 1960. Cost of improvements and installation of equipment reported to be about $3.5 million.

Minneapolis, Minn.—Owens-Illinois Glass Co., Ohio Building, Toledo, O., plans to construct a corrugated box plant on the Minnesota River, near here. Construction of the plant will get under way at once and it is expected to be completed by early 1960. The box plant will occupy 153,000 sq ft of floor space and will take up 21 of the 77 acres purchased by the company in the Valley Industrial Park.

St. Louis, Mo.—Gereke-Allen Carton Co., 5101 Penrose St., St. Louis, Mo., subsidiary of Eddy Paper Corp., 919 N. Michigan Ave., Chicago, Ill., plans to construct a 120,000-sq ft paper box plant. Ground has already been broken and building is scheduled to be completed by late 1960 at a cost of approximately $1 million.

Linden, N. J.—Bayway Refinery of Esso Standard Oil Co., 15 West 51st St., New York, N. Y., plans an expansion and building program at refinery located here. Program calls for construction of a new laboratory, a catalytic cracking unit, a white oil acid-treating plant and a large storage tank for ethylene. Construction will begin at once for completion by late 1960.

Glens Falls, N. Y.— Glens Falls Portland Cement Co. has announced a contract award involving $3 million to the Allis-Chalmers Mfg. Co., 864 S. 70th Street, Milwaukee, Wis., for installation and construction of a clinker-grinding building at local operations here. Work is already under way on the new building which is scheduled for operation by the spring of 1960.

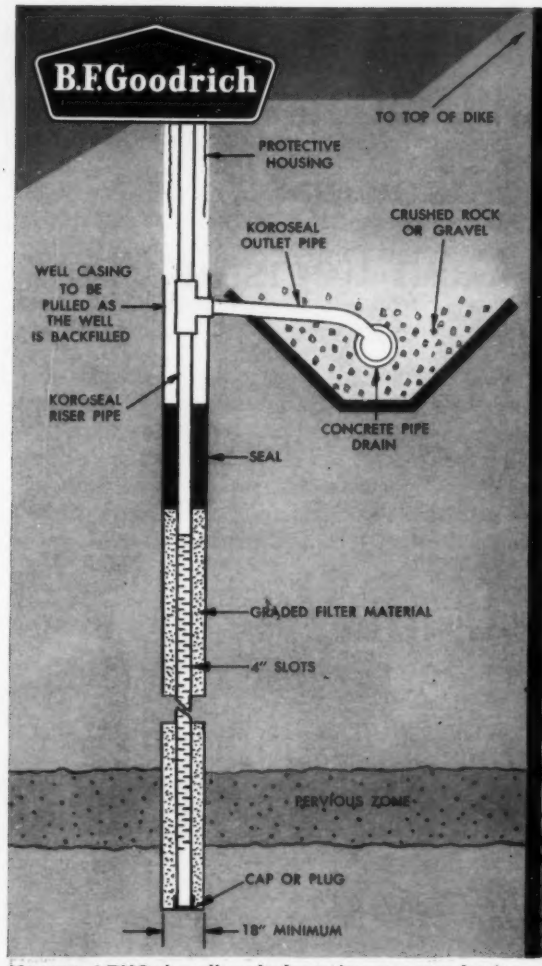
Ticonderoga, N. Y. — International Paper Co., 220 E. 42nd St., New York, N. Y., has announced that preliminary engineering plans are under way for the addition of a two story multi-million dollar building here to house paper-making machinery at this complex. Construction is expected to begin as soon as plans are completed and completion of project is targeted for 1961.

Elizabeth, N. J.—Singer Sewing Machine Co., 149 Broadway, New York, N. Y., plans to vacate its main plant here and consolidate its production in newer structures equipped for automation over a two year period. Company has already made a $5 million investment in the conversion to automation and has plans for the future with an expenditure of another $4 million. All manufacturing operations will eventually be located in one-story brick and concrete buildings constructed on a 100-acre tract south of Trumbull St.

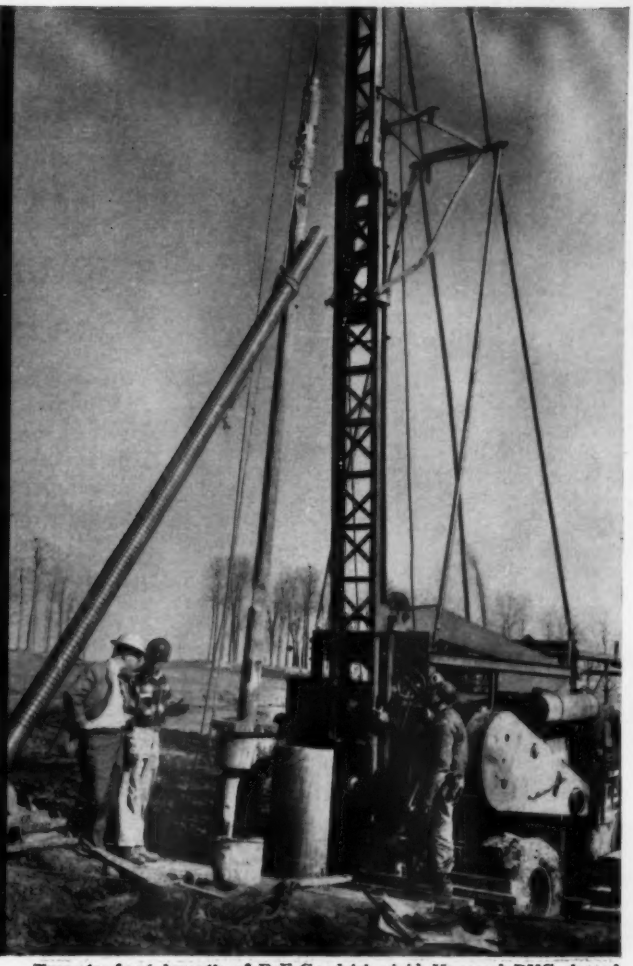
Henderson, N. C.—Laurens Glass Works, Inc., Laurens, S. C., plans to construct a glass container plant for the manufacture of soft-drink bottles and glass containers for processed foods and household chemicals. The new unit will represent an investment of several millions of dollars. Work on the new structure is already under way and is scheduled for completion by late 1960 or early 1961.

Cuyahoga Falls, O.—Lawson Milk Company, subsidiary of Consolidated Food Corp., 135 S. La Salle St., Chi-

(Continued on page 230)



Koroseal PVC pipe relieves hydrostatic pressures under the toe of dikes built along the St. Lawrence Seaway from Waddington, N. Y. to Massena, N. Y. Underground water enters the Koroseal riser pipe through a series of slots. Under pressure, water rises inside pipe and is discharged through Koroseal drainage pipe to natural drainage channels.



Twenty-foot length of B.F.Goodrich rigid Koroseal PVC slotted pipe swings into position for sinking as a relief well. More than 2,000 feet of this Koroseal pipe, known for its resistance to corrosion, taps "pervious zones" beneath dikes and draws off underground water that might otherwise weaken the structures.

B.F.Goodrich Koroseal PVC pipe protects dike system on St. Lawrence Seaway

WHEN gates of the new Long Sault dam and St. Lawrence power dam were closed, a lake extending 35 miles upstream was formed. Dikes, some as high as 85 feet, were built to safeguard the surrounding countryside, including some populated areas which were 40 feet below the lake level.

To protect against excess hydrostatic pressures along the dike toe, 23 relief wells of 6-inch B.F.Goodrich Koroseal PVC pipe were installed to serve as automatic safety valves. These Koroseal relief wells tap "pervious zones" 20 to 50 feet beneath the dikes and draw off underground water that might otherwise undermine embankments.

In this installation, engineers specified Koroseal PVC pipe because of its superior resistance to corrosion and its strength. Koroseal also has high impact resistance and superior insulation qualities. It threads easily, can be cut, welded or drilled. It never needs to be painted, will not support combustion. Koroseal is available in pipe, tubes, rods, valves and sheets. For information, just send in the coupon.

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☐ Rigid Koroseal Pipe
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Koroseal pipe slotted and sold by F. C. Nichols, Inc., Norwood, Syracuse and Niagara Falls, New York.

B.F.Goodrich *Koroseal rigid PVC products*

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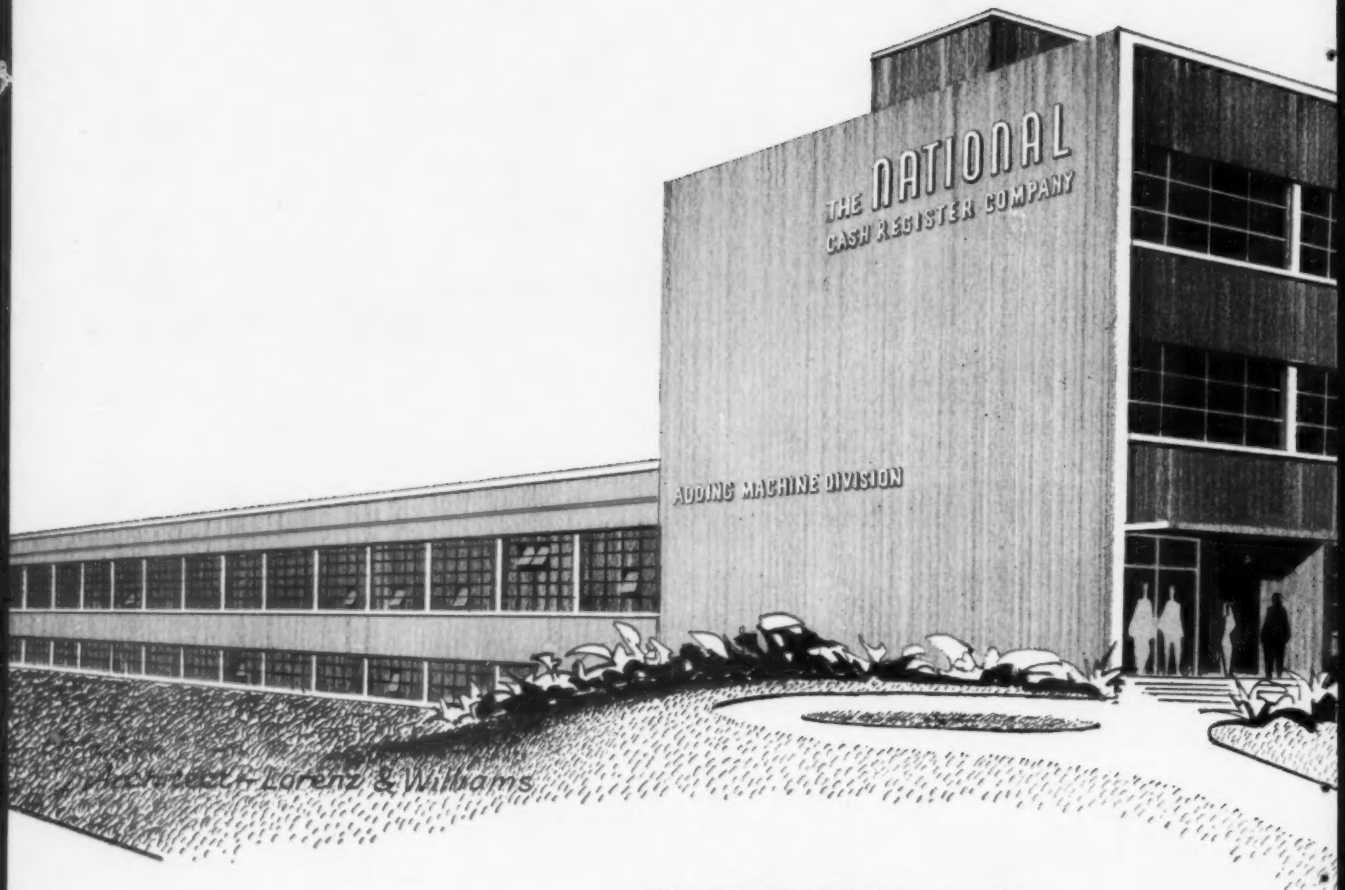
Panelboard planning helps Power-Up The National Cash Register Plant



Owner: The National Cash Register Co., Dayton, Ohio
Architects: Lorenz and Williams, Architects and Engineers, Dayton, Ohio
Consulting Engineer: Schweiger, Heapy & Associates, Dayton, Ohio
General Contractor: Streeter Associates, Inc., Elmira, N. Y.
Electrical Contractor: Buffalo Electric Co., Inc., Buffalo, N. Y.
Westinghouse Distributor: Buffalo Electric Co., Inc., Buffalo, N. Y.

For more facts circle 572 on Reply Card

An all-Westinghouse electrical distribution system meets all requirements

The new Adding Machine Division Plant of The National Cash Register Company in Ithaca, New York, was carefully planned to provide for efficient production and future plant expansion. Completely Westinghouse equipped, this new plant has a 50% reserve electrical capacity that can be utilized readily with the spare equipment now installed.

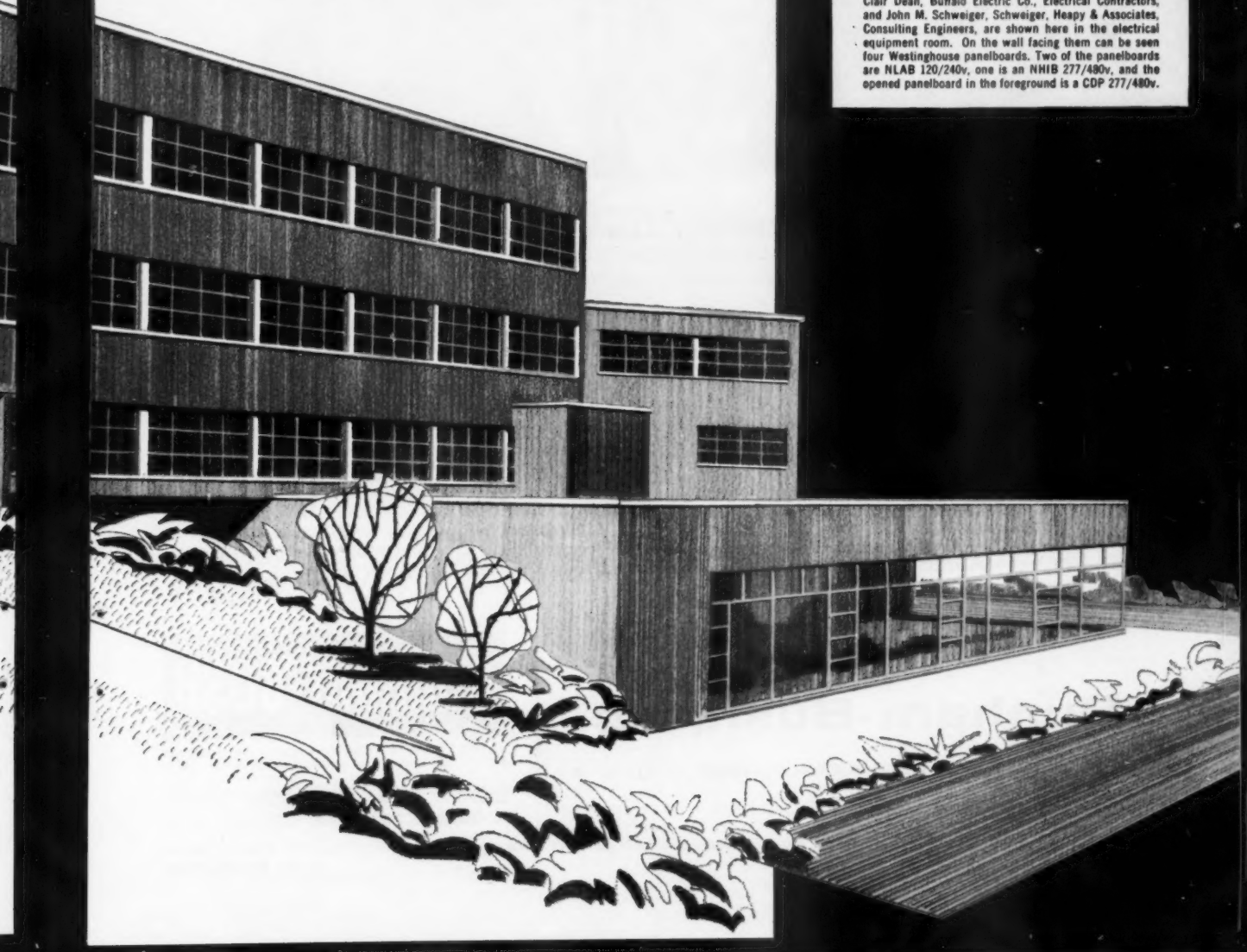
Westinghouse works closely with you in planning for future and present electrical needs, and in providing flexible and efficient systems that can be adapted to any changes in your production methods. Find out how Westinghouse Power-Up planning can increase the efficiency of your installation. Contact your nearby Westinghouse office, or write: Westinghouse Electric Corporation, Box 868, Pittsburgh 30, Pa.

J-93549

YOU CAN BE SURE... IF IT'S Westinghouse

WATCH "WESTINGHOUSE LUCILLE BALL-DESI ARNAZ SHOWS" CBS TV MONDAYS

Clair Dean, Buffalo Electric Co., Electrical Contractors, and John M. Schweiger, Schweiger, Heapy & Associates, Consulting Engineers, are shown here in the electrical equipment room. On the wall facing them can be seen four Westinghouse panelboards. Two of the panelboards are NLAB 120/240v, one is an NHIB 277/480v, and the opened panelboard in the foreground is a CDP 277/480v.



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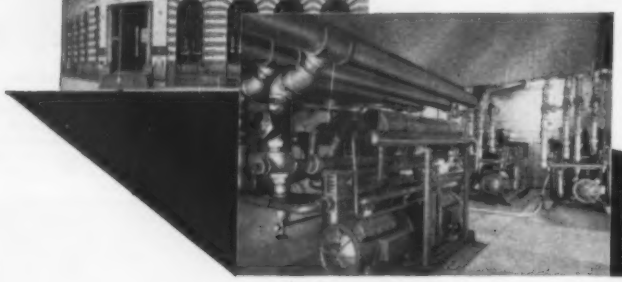
E. L. Bunch



*** 45 TON LOAD IS HANDLED BY THREE 15 TON HEAT-X PACKAGE CHILLERS. EACH CHILLER IS EQUIPPED WITH TWO 7½ TON BRUNNER-METICS TO CONDITION ANY OR ALL OF THREE ZONES.**

The Plant Engineer and others concerned with American Thread Company's air conditioning, in effect wore "three hats".

They wore the "hat" of an efficiency expert in installing a system that can be inter-changed to condition any or all of three zones.

They wore the "hat" of an insurance counsellor in providing an inter-locked system that will continue to function and localizes possible failure points.

They wore the "hat" of a shrewd purchasing agent in selecting all Dunham-Bush equipment for the system (Heat-X Package Chillers... Air Handling Units... Indoor Tower... and Air Compressors by Brunner Division).

Whether you're planning a new air conditioning system or bringing your present system up to date, pose your problem to your Dunham-Bush sales engineer. He can give you advice that lets you wear "three hats" as well as your own.

Write for free information on Dunham-Bush air conditioning, heating and refrigeration installations 'round the country.

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AIR CONDITIONING • REFRIGERATION • HEATING • HEAT TRANSFER

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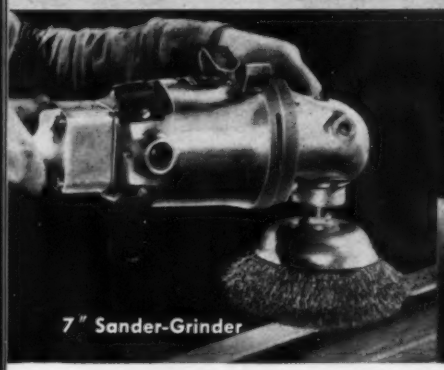
PRODUCTION...CONSTRUCTION...MAINTENANCE



7" Sander-Grinder

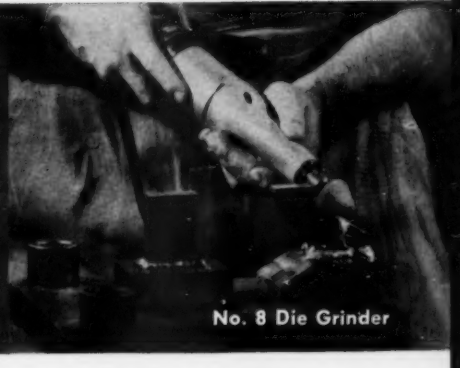
No. 12 Scrugun®

No. 11 Jig Saw

whether the job's drilling, sanding, sawing,

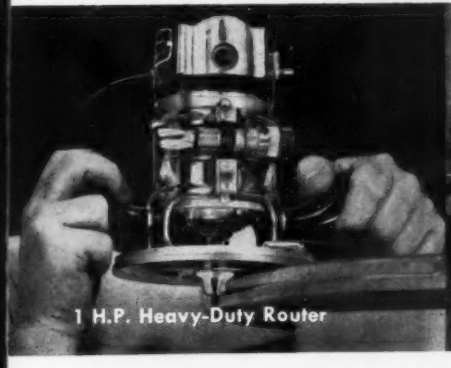
7" Super-Service Saw

No. 88 Finishing Sander

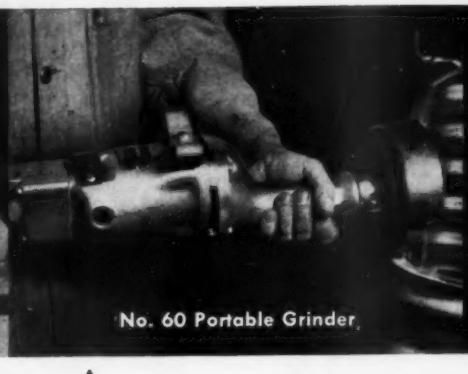


No. 8 Die Grinder

fastening, grinding, bolting, chipping...



1 H.P. Heavy-Duty Router



No. 60 Portable Grinder

3/8" Standard Holgun®

Black & Decker® tools cut your costs!

Look Under "TOOLS-ELECTRIC" in Yellow Pages

Save time whenever you need a portable electric tool . . . simply call your local Black & Decker distributor. He stocks over 125 tools and 3,000 accessories to give you complete selection, fast delivery, tool know-how and personal service. Or, for complete tool information mail coupon at right.

For more facts circle 574 on Reply Card

THE BLACK & DECKER MFG. CO., Dept. 0805, Towson 4, Md.

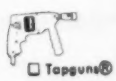
Send me information on.....

Name..... Title.....

Company.....

Address.....

City..... Zone..... State.....



☐ Tapguns®

☐ Bench Grinders

☐ Belt Sanders

☐ Hammers

Stop these maintenance miseries (and others) in your plant...

Molysulfide™

is the cure!

Sure, problems like frozen nuts and galled spline drives won't put you out of business—but they'll put a crimp in your important maintenance schedules! The answer?

Molysulfide paste lubricants! These special lubricants—containing 25-70% Molysulfide—are tailor-made for the toughest maintenance-lubrication problems you've got. Here's why . . .

Molysulfide films out on metal surfaces. It forms a *rugged, heat- and cold-resistant, low-friction film* that prevents metal-to-metal contact even after man-sized hard knocks have pounded or squeezed base grease away. That's why Molysulfide *stays put* to lubricate as a long-term cure for such headaches as galling and seizing . . . stick-slip . . . chatter, fretting, and a whole host of other miseries. *But see for yourself!*

Try Molysulfide paste lubricants in your own shop. *Try just one pound*—order it from any of the manufacturers listed below. You'll agree—Molysulfide is worth its weight in aspirin! *Climax Molybdenum Co., a division of American Metal Climax, Inc., 500 Fifth Ave., New York 36, New York.*

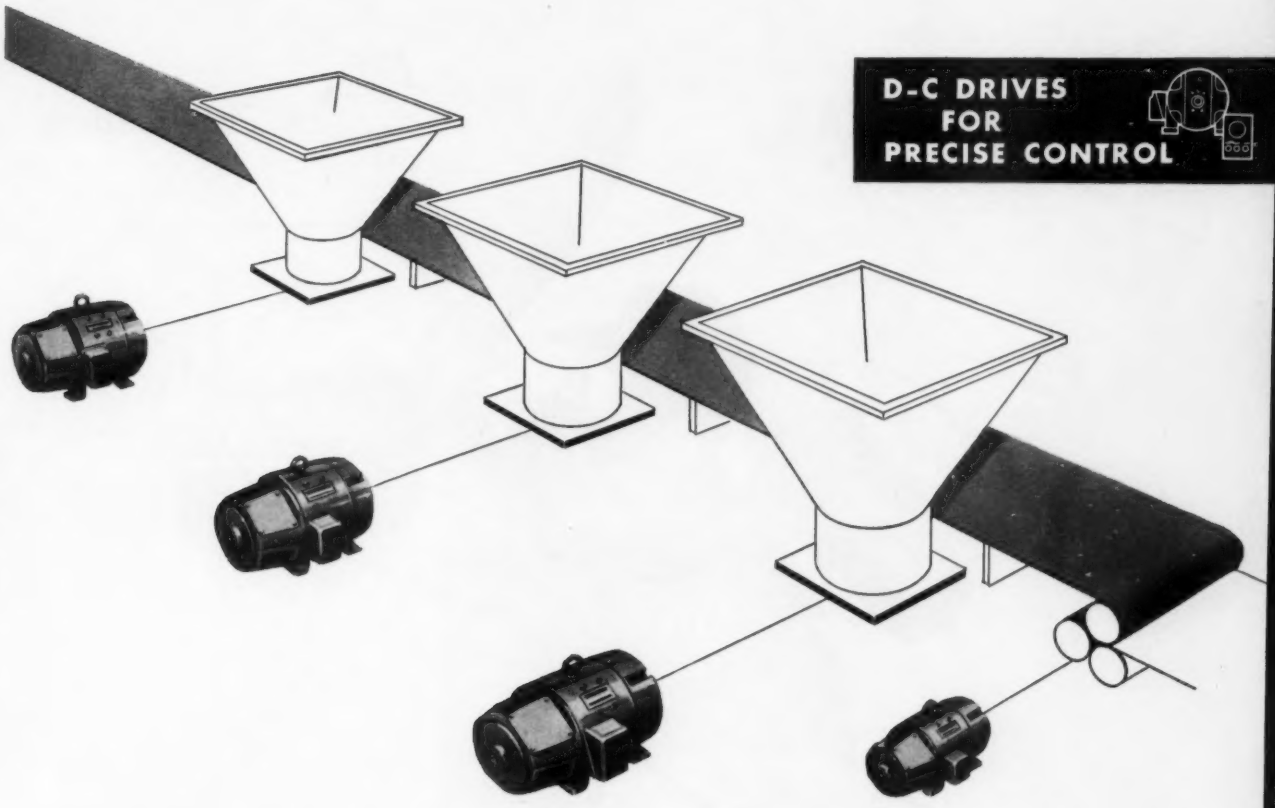
CLIMAX MOLYBDENUM

Try a pound of Molysulfide paste lubricant for heavy-duty maintenance applications! Order it today from any of these well-known manufacturers: Acheson Colloids Co., Port Huron, Mich. • The Apha Molykote Corp., 65 Harvard Ave., Stamford, Conn. • American Lubricants Co., 1227 Deeds Ave., Dayton, Ohio • Basco, Inc., 730 W. Jackson St., P. O. Box 461, Milwaukee 1, Wisc. • Bel-Ray Co., Green Village Rd., Madison, N. J. • Bemol, Inc., 131 State St., Boston 9, Mass. • Fiske Bros. Refining Co., 1500 Oakdale Ave., Toledo, Ohio • Hohman Plating & Mfg. Co., Inc., 905 East 3rd St., Dayton, Ohio • Jet Lube, Inc., 3093 N. California St., Burbank, Calif. • McGee Chemical Co., 8000 West Chester Pike, Upper Darby, Pa. • Ore-Lube Co., 11 Front St., New York, N. Y.

For more facts circle 575 on Reply Card

For more facts circle 574 on Reply Card

☐ Tapguns® ☐ Bench Grinders ☐ Belt Sanders ☐ Hammers



D-C DRIVES FOR PRECISE CONTROL

Problem: How to control machine speed ratios for accurate proportioning, continuous flow

Keeping the blend accurate in proportionate mixing requires a high degree of machine coordination. Inaccurate speed matching of mixers or conveyors can result in poor product quality, inaccurate measure, wasted material.

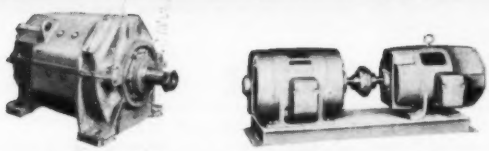
ACCURATE SPEED MATCHING IS A NATURAL JOB FOR DIRECT-CURRENT POWER. For only direct current can provide the split-second response, wide speed range and precise control vital to modern, automatic machines.

If you are planning to upgrade your production facilities to make processes more automatic, it will pay you to investigate the role direct current can play. A new booklet, "WHY D-C?," is available to help you. For your free copy, write *Section 829-2, General Electric Company, Schenectady 5, N. Y.*

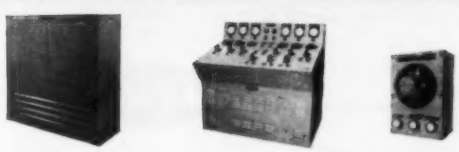
Progress Is Our Most Important Product

GENERAL ELECTRIC

SELECT FROM GENERAL ELECTRIC'S COMPLETE LINE OF D-C DRIVES



MOTORS AND GENERATORS



POWER UNITS AND CONTROLS

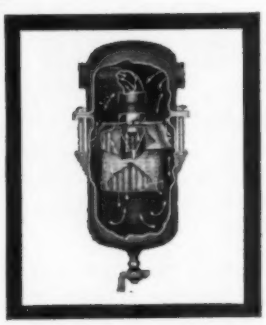
For more facts circle 576 on Reply Card

KEEP IT CLEAN

by Phil Tration

As a batter, Bill couldn't hit beans;
Got dust in his eyes, it seems.
Someone whispered the clue—"Use a Filter, Staynew,"
Now, he hits the ball like a fiend.

Let's see how your batting eye is. Take a look at the advantages of Dollinger Staynew Filters—they do a top job of cleaning, they're easy to maintain, and they're available for whatever degree filtration you need. Don't get caught in a squeeze play; call in your Dollinger sales engineer today. He'll show you how to stay away from those "foul" lines—foul air, liquid, or gas lines, that is.



STAYNEW MODEL CPHS PIPE LINE FILTER has the exclusive "double action principle." Air is first deflected to outer walls of Filters and forced downward at high speed. Water, oil, and heavier particles of rust, etc. are thus deposited in base. Mechanically cleaned air then rises to pass through filtering medium which removes lighter airborne particles. This "double action" design eliminates need for frequent cleaning.

Inexpensive, simple to install, Dollinger Pipe Line Filters pay for themselves in reduced maintenance alone. Why not talk over your filtration problems with a Dollinger engineer . . . or write for Bulletin 200 which gives engineering data on pipe line filters. Dollinger Corporation, 55 Centre Park, Rochester 3, N. Y.

REG. PROTECTOMOTOR U.S. PAT. OFF.

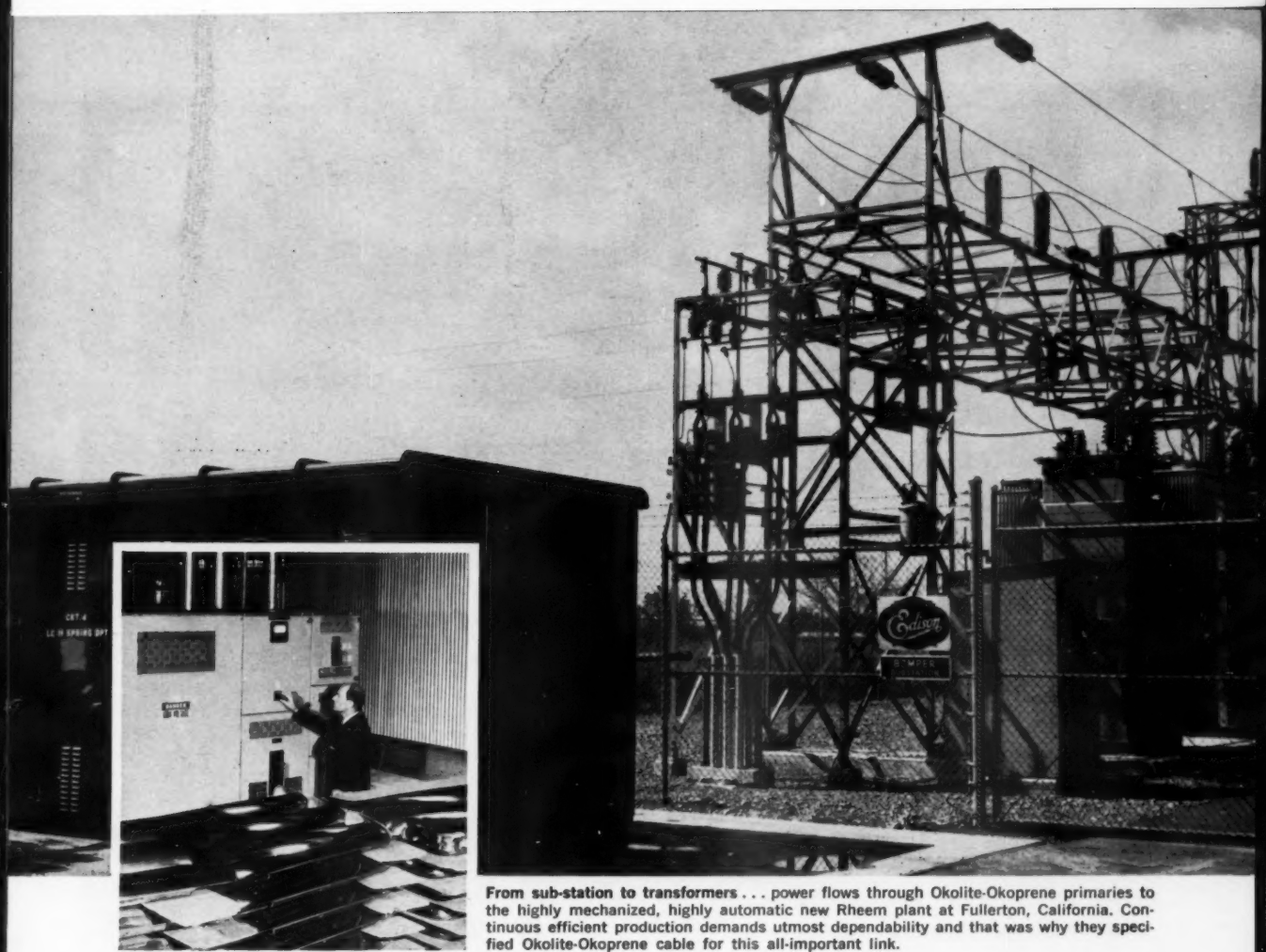
STAYNEW FILTERS

DOLLINGER

SPECIALIZING IN DRY TYPE FILTERS FOR OVER 35 YEARS

LIQUID FILTERS • PIPE LINE FILTERS • INTAKE FILTERS • HYDRAULIC FILTERS • ELECTROSTATIC FILTERS • MIST COLLECTORS • DRY PANEL FILTERS • SPECIAL DESIGN FILTERS • VISCOUS PANEL FILTERS • LOW PRESSURE FILTERS HIGH PRESSURE FILTERS • AUTOMATIC VENTILATION FILTERS • NATURAL GAS FILTERS • SILENCER FILTERS

For more facts circle 577 on Reply Card



From sub-station to transformers . . . power flows through Okolite-Okoprene primaries to the highly mechanized, highly automatic new Rheem plant at Fullerton, California. Continuous efficient production demands utmost dependability and that was why they specified Okolite-Okoprene cable for this all-important link.

Okolite-Okoprene 12kv primaries specified for Rheem's "must-not-fail" operation

"When you're dealing with 12,000-volt primary distribution, you don't fool around," says Mr. Arthur A. Pfeifer, assistant to the General Manager of Rheem Manufacturing Company's Automotive Division at Fullerton, California.

"The Fullerton plant is one of Rheem's newest and smartest and had to have nothing but the latest and best equipment. We knew that meant Okolite-Okoprene cable and we used it. It has worked perfectly since installation, has required no maintenance, and we would recommend it to anyone."

Selected as one of the ten best new plants in the country last year, this highly efficient plant uses the most modern power distribution techniques to keep its plant presses and plating baths operating. Production will pass one million auto bumpers, one million auto springs and three million bumper arms per year.

All power for this must-not-fail operation flows through Okolite-Okoprene 12,000-volt primary distribution lines, designed to supply a future 100% increase in plant capacity. They connect outdoor sub-station switchgear to 13 indoor step-down transformer centers which distribute to plant operations at 480 volts.

For *your* vital circuits, Okolite-Okoprene offers constructions of utmost reliability combined with exceptionally long life. Okolite insulation has a 30-year record of service, maintaining in severest installation conditions its high dielectric strength and great resistance to corona cutting, moisture and heat. Okoprene sheathing offers unusual protection against weather, abrasion, ozone, heat, cold, many acids, alkalies, and chemicals. Application of the insulation by the strip process is the ultimate assurance of matchless quality. For the Okolite-Okoprene cable that best suits your needs, see 128-page Bulletin PE-1075. It's free; just write The Okonite Company, Passaic, New Jersey.

where there's electrical power . . . there's **OKONITE CABLE**

6221

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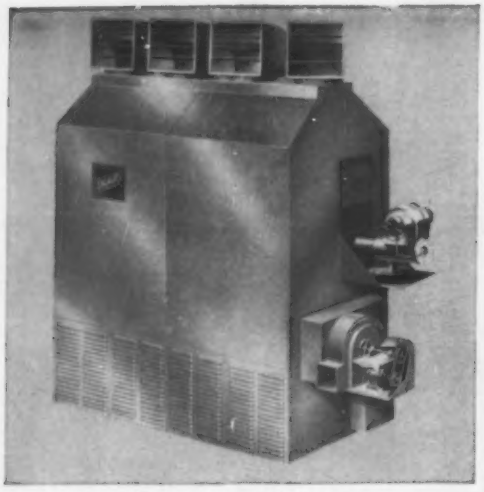
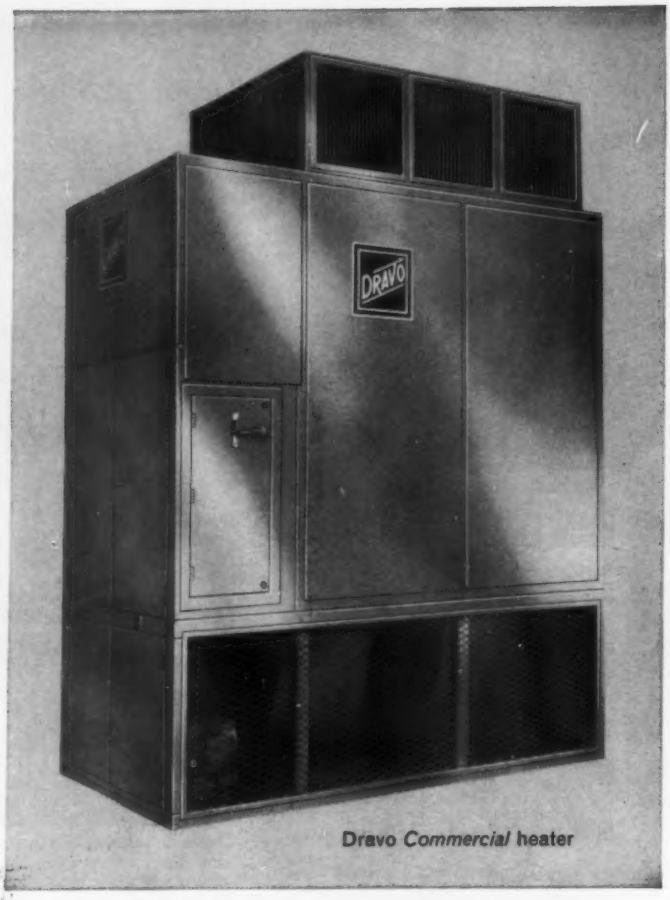


Dravo *Industrial* heater

Dravo *Paraflo* heater and *Suspended Unit* heater



Dravo *Commercial* heater

ONLY DRAVO HAS ALL 4

1. **FULL LINE**—A size and type for every heating need
2. **DESIGN AND APPLICATION KNOW-HOW**
3. **NATION-WIDE SERVICE**
4. **RESEARCH**

Dravo's full line of heaters is backed by a highly trained and extensive service organization, with a reputation for dependability and thoroughness.

This is only one of the "extras" that benefit Dravo customers. The performance built into every Dravo heater is applied so that each installation functions with maximum efficiency. This is only possible because *every* Dravo technical representative *is a qualified heating engineer.*

Complete research and laboratory facilities conduct continuous studies of heater design problems. With the experience gained from over 10,000 installations, these studies result in basic improvements in all phases of both heater engineering and its application to unusual heating problems.

Make sure you get "ALL 4" when you are buying space heating. Only Dravo has the manpower, the technical background, and the facilities to assure your getting the most for your money. Write Dravo Corporation, Pittsburgh 22, Pennsylvania.

DRAVO
CORPORATION

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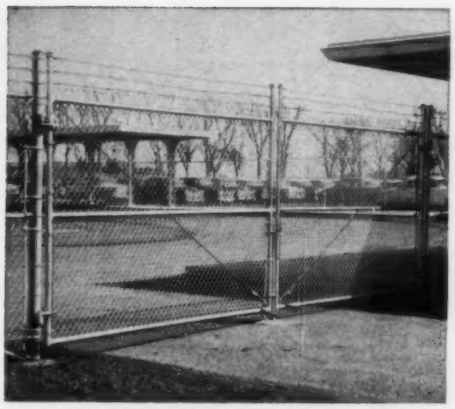
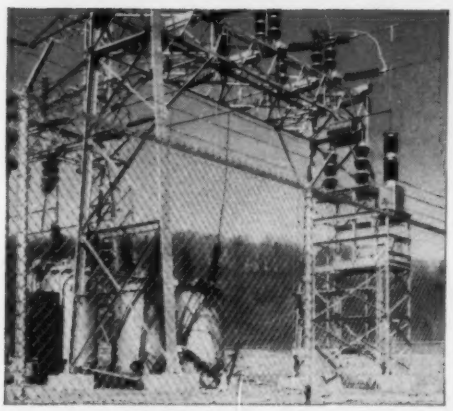
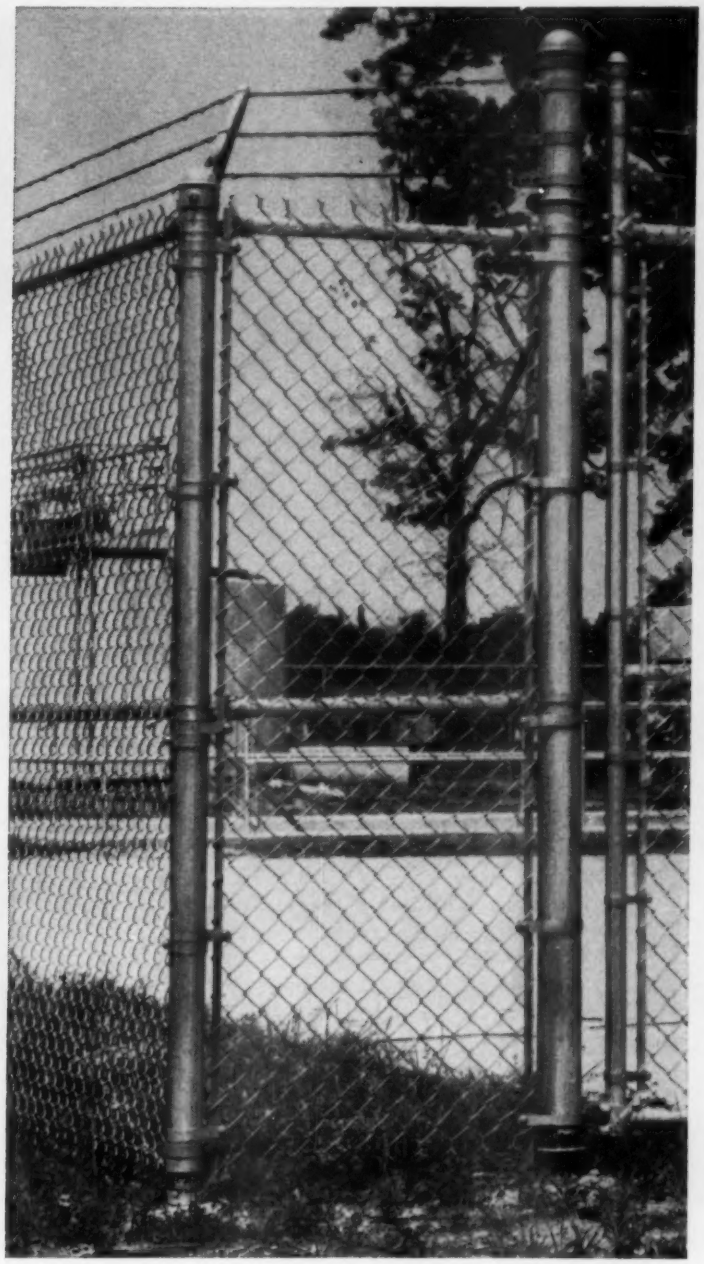
For more facts circle 578 on Reply Card







with Aluminum THIS FENCE IS MAINTENANCE-FREE!

Chain Link Fencing of Alcoa Aluminum Needs No Protective Painting

Because aluminum supplies its own protection against highly corrosive industrial elements, applications throughout the years have proven advantages more than skin deep. Alcoa® Aluminum alloys age to a pleasing shade of gray and need no painting to preserve appearance or strength.

The superior combination of durability and appearance in chain link fencing of Alcoa Aluminum is evidenced in installations over 30 years old. Alcoa Aluminum consistently outlasts conventional installations . . . with an absence of maintenance cost.

Check these other advantages you get with Alcoa Aluminum:

High Strength—Average tensile strength of Alcoa's new alloy is 57,500 psi.

Easy Erection—Light weight means less labor.

Readily Available—Reliable manufacturers and erectors in 48 states. Contact your nearest Alcoa sales office.

For your copy of 12-page illustrated booklet and a summary of recently bid prices on 4-ft-high and 6-ft-high all-aluminum fencing, write to Aluminum Company of America, 2057-E Alcoa Building, Pittsburgh 19, Pa.

ALCOA ALUMINUM

Your Guide to the Best in Aluminum Value

For Exciting Drama Watch "Alcoa Theatre," Alternate Mondays, NBC-TV, and "Alcoa Presents," Every Tuesday, ABC-TV

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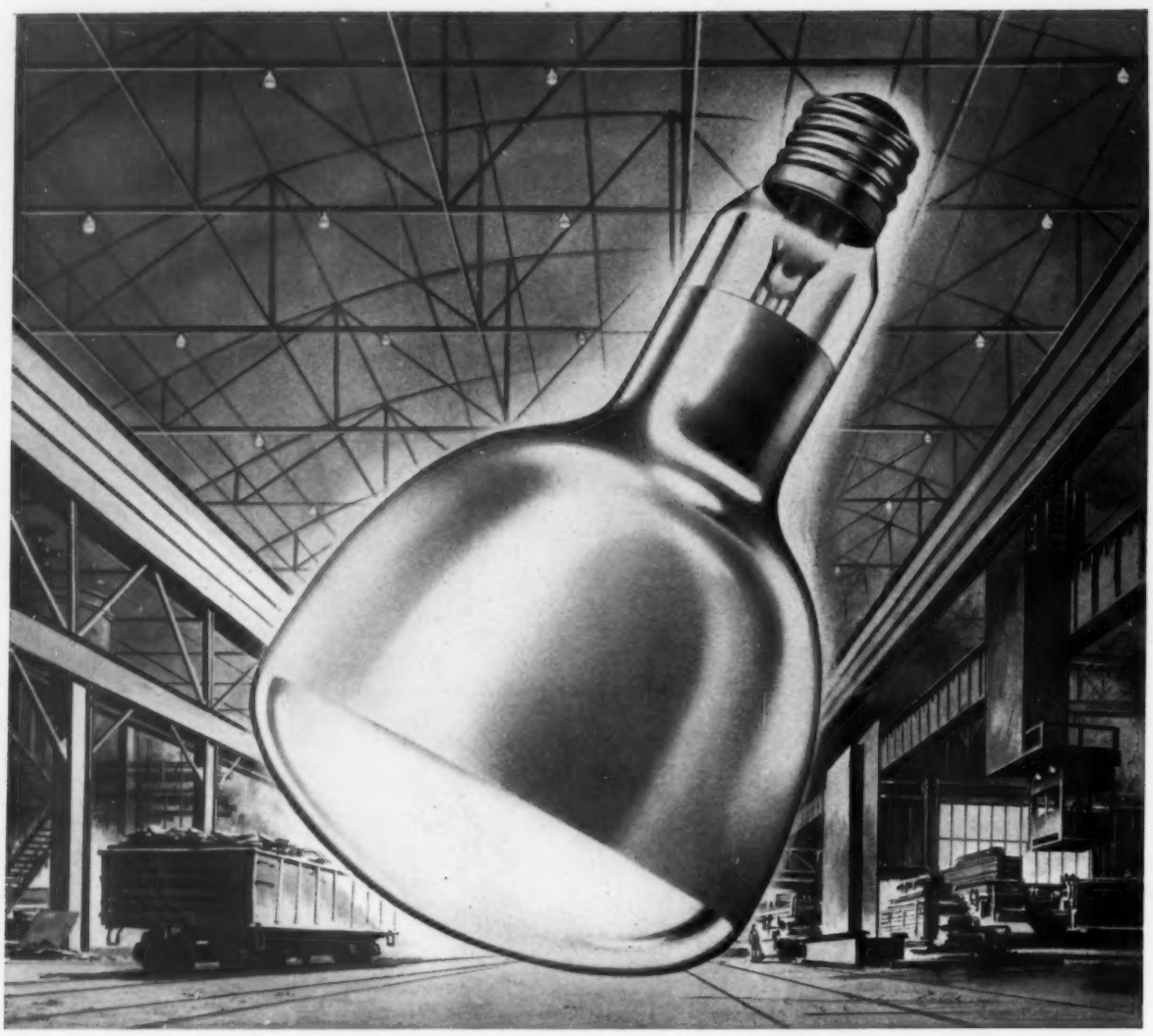


For your high-bay installations . . .

this Sylvania reflector lamp directs light where you can best use it

Now, get all the light you need . . . where you need it . . . for the life of the lamp.

Sylvania's R-52 reflector "high-bay" lamp has a sealed-in reflector that is 100% dirtproof. It eliminates costly, time-consuming fixture cleaning. It is particularly useful in plants bothered by severe dirt, grease and smoke.

The reflector directs and concentrates maximum usable working light downward to help increase productive efficiency . . . to provide more useful light for the same wattage. There is no upward wasted light.

Sylvania R-52 reflector lamps come in 500-, 750- and 1000-watt sizes, in either hard or soft glass (1000-watt in hard glass only). Rated average lamp life on all types is 2000 hours. Learn how these lamps are now helping industrial plant managements across the country effect important lighting economies, achieve greater lighting efficiency.

Call your Sylvania Supplier for complete information, or write:

SYLVANIA LIGHTING PRODUCTS
Dept. 9L-9005, 60 Boston St., Salem, Mass.
In Canada: Sylvania Electric (Canada) Ltd.
P. O. Box 1190, Station "O", Montreal 9

SYLVANIA
Subsidiary of
GENERAL TELEPHONE & ELECTRONICS

For more facts circle 581 on Reply Card

For more facts circle 582 on Reply Card →

TEXACO ORGANIZED LUBRICATION CAN HELP YOU...

Get rid of the "guns" that "misfire"

His grease guns are aimed at your profits; they can help boost them—or eliminate them altogether. Here's why:

You used to need a different grease for nearly every job. That meant 20 or 30 lubricants in the plant, with the almost inevitable danger of misapplication — and damaged machinery.

Unless you're operating on the basis of a modern lubrication survey, *the chances are that this situation still exists in your plant!*

A Texaco Organized Lubrication Plan uses a minimum number of proper oils and greases—including newly developed multipurpose lubricants—to reduce your inventory by as much as 80% and virtually eliminate this problem.

Get the details on Texaco Organized Lubrication. Contact your local Texaco Lubrication Engineer or write for "Management Practices that Control Costs via Organized Lubrication."

The Texas Company, 135 East 42nd Street, New York 17, N. Y., Dept. E-100.

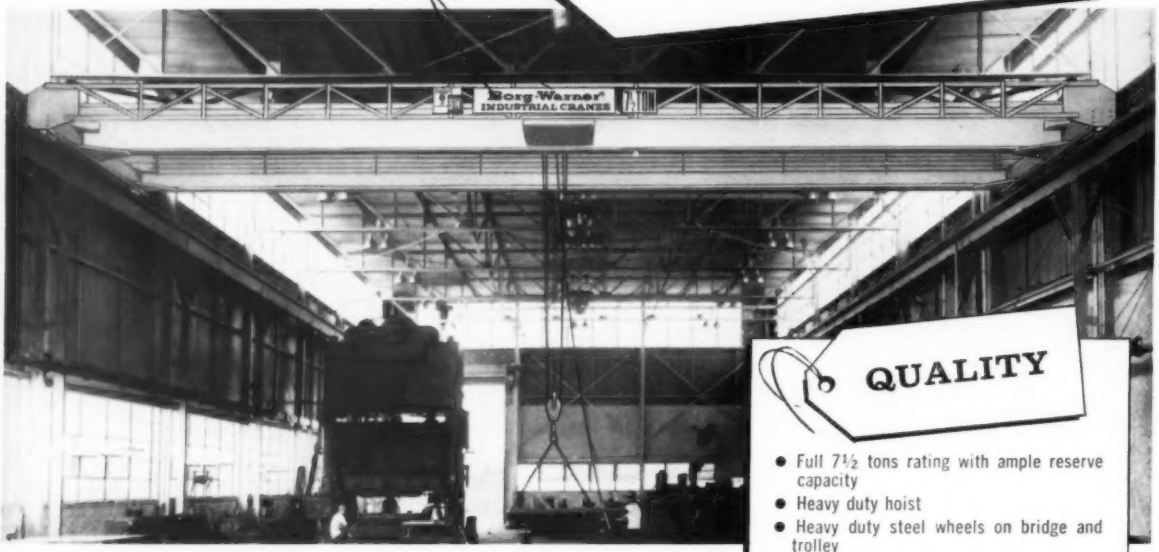
LUBRICATION IS A MAJOR FACTOR IN COST CONTROL

Borg-Warner Industrial Cranes

Quality at a price you can afford...

$9900.00

For a 7½-Ton, 60 Ft. Span,
3 Motor, Top-Running Double Girder
Industrial Service Crane



Why Borg-Warner Industrial Cranes are BETTER VALUES

Value is determined in QUALITY *and* PRICE . . . and, a price like this for superior Borg-Warner Industrial Cranes construction and performance assures you of top value for your materials handling investment.

If you want to boost your production and operating profits by making full use of overhead space for materials handling . . . if you can use the extra storage space an overhead crane will provide as compared with fork-truck stacking . . . if you can benefit from aisles and work areas cleared of floor-type handling equipment . . . it will pay you to consider a Borg-Warner top-running, motor-driven crane like this. The cost may be far less than you had imagined. One crane owner thought it would cost him nearly four times this price to duplicate his crane.

Borg-Warner Industrial Cranes offers a complete line of overhead cranes . . . for light, medium or heavy service . . . constant or intermittent service at slow, medium or high speeds . . . operation from cab or floor. Get in touch with B-W Industrial Cranes today for answers to your materials handling problems.

QUALITY

- Full 7½ tons rating with ample reserve capacity
- Heavy duty hoist
- Heavy duty steel wheels on bridge and trolley
- All welded jig bored and jig assembled end trucks
- Long life precision ball and roller bearings
- Large gusset plates at end trucks
- Outrigger machinery girder construction
- Heavy duty gear reduction bridge drive
- Fluid coupled bridge and trolley drives
- Full magnetic push button control
- Magnetic bridge brake

MODERN DESIGN

The crane illustrated is a typical double girder installation. For shorter spans, smaller capacities and lighter or intermittent duty Borg-Warner Industrial Cranes can supply your needs at even lower prices.

Industrial CRANES
INGERSOLL PRODUCTS
B-W
BORG-WARNER

Design it better . . . Make it better.

Find Your Nearest Distributor Under CRANES In The Yellow Pages

Distributors in all principal industrial cities

Borg-Warner® INDUSTRIAL CRANES

1514 S. PAULINA STREET, CHICAGO 8, ILLINOIS

Export Sales: Borg-Warner International, 36 South Wabash Ave., Chicago 3, Illinois

For more facts circle 583 on Reply Card

THERE MUST BE AN EASIER WAY

SAME OLD GUESSING GAME EVERY DAY— "DRAWING, DRAWING, WHO'S GOT THE DRAWING?"
ANY OF YOU GUYS SEEN THAT HOOTAN HOLLER DRAWING A-6105?
HE SAYS I FILED IT WRONG
I'LL LOOK IN THE WASTEBASKETS AGAIN
DIDN'T WE THROW THAT OUT THE WINDOW WHEN THE PARADE WENT BY?
I THINK SOMEONE TOOK IT OUT TO THE COAST OR SOMETHING
WE WON'T HAVE ANY DRAWINGS LEFT IF WE DON'T CALL IN A BLUEPRINTER AND ORDER AUTOPOSITIVE PAPER INTERMEDIATES.

Much easier for you when you have your local blueprinter—or your printroom—make intermediates of your drawings on Kodagraph Autopositive Paper.

That simple act lets you file away your valuable originals safely in the vault. And there they can rest until you need more Autopositive Paper Intermediates to replace any you may lose.

Your Autopositive Paper Intermediates—with dense black photographic lines on clean, white, translucent background—take the place of originals in drafting and printmaking. They won't smudge or smear. Yet you can make drafting changes at will. And after doing so, you can make "Autopositives" from "Autopositives". . . get brand-new, ink-like "drawings."

Kodagraph
Reproduction Materials

The cost of these intermediates is trifling compared to the savings in drawing protection and drafting short cuts—not to mention the higher print quality obtained.

EASTMAN KODAK COMPANY
Graphic Reproduction Division, Rochester 4, N. Y.

MAIL COUPON FOR FREE BOOKLET

EASTMAN KODAK COMPANY
Graphic Reproduction Division, Rochester 4, N. Y. 218-5

Gentlemen: Send me a free copy of your booklet on Kodagraph Reproduction Materials.

Name_____

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Company_____

Street_____

City_____ Zone_____

State_____

Kodak
TRADE MARK

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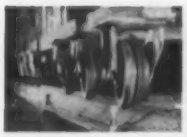
MATERIALS-HANDLING NEWS

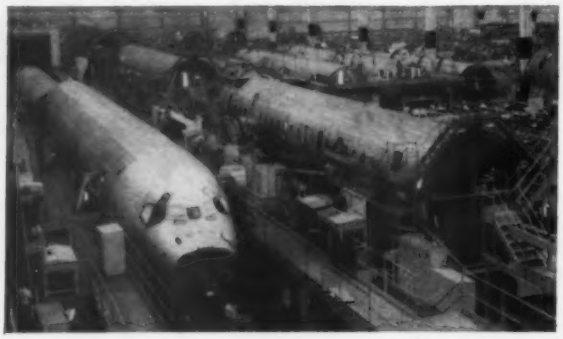
NEW AND UNUSUAL APPLICATIONS OF BASSICK CASTERS THAT MIGHT BE ADAPTED TO YOUR HANDLING PROBLEMS

Jet age materials handling techniques used in production of Douglas DC-8



Grooved wheel casters

Major advantages of Bassick grooved wheel casters are more efficient movement of materials, better utilization of floor space, floor protection and close control of parts and equipment handled.



As the 19,000 pound fuselage assemblies for DC-8 Jetliners take form in the DC-8 assembly building at Long Beach, California, big Bassick Grooved Wheel casters shoulder the giant load.

Many other handling jobs in the production of more than a hundred DC-8 Jetliners at Douglas Aircraft Company, Inc., were also turned over to grooved wheel casters, operating on inverted angle iron tracks (see inset). Handling fixtures rode grooved wheel Bassicks to bring workers into position to assemble nose section. And lower fuselage sections are rotated on rigid grooved wheel casters built into giant turning rings which themselves ride additional grooved wheel casters.

As material and labor costs continue to rise, many major aircraft and other companies are streamlining materials handling methods as a means of holding price and profit lines . . . an idea well worth your careful consideration.

NEW SANITARY CASTERS

Bassick's new B-line includes 4" and 5" rigid and swivel casters. They are specially designed for easy cleaning to conform with the Baking Industry's Sanitary Standards. Sanitary casters are ideal for use in food processing, bottling plants, restaurants, pharmaceutical houses, fine chemical plants, textile plants, hospitals . . . anywhere cleanliness is important.

Casters on duty at White Sands Proving Ground

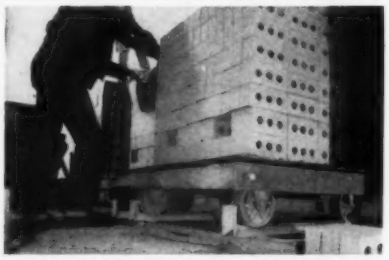
When IGY researchers use modified Nike missiles (above) to gather temperature, pressure and wind data, the launcher rolls out to the pad on casters. Bassick casters are also widely used in missile production as well as launching and testing. Reason: sturdy Bassick quality construction safeguards loads handled.

Your Distributor can keep you up-to-date on handling methods

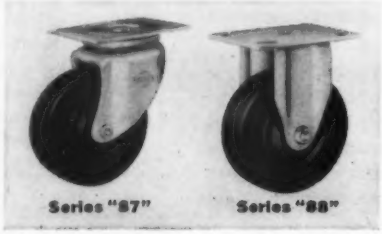
Don't be fooled by the big wooden wheels on this modern Trojan Horse. Actually, it rolls on Bassick Series "77" swivel and "78" rigid casters underneath. Point is that we've learned something about materials handling in the past 4000 years. And we keep learning . . . with new ideas, new products, new angles coming up all the time. Good man to keep you abreast of the latest materials handling data is your local industrial distributor who handles Bassick casters. It's good business to know him. 9.36

RUGGED CASTER DUTY

At Robinson Brick & Tile Company, Denver, Colorado, they "package" 20 million bricks a month. Bricks are mounted on nine carts equipped with rigid Bassick grooved wheel casters, rolled into position for steel strapping and then placed in storage by a fork lift truck. The casters above are left in the open, exposed to all weather and have been used three years without replacement.



New "Qualecon" casters



Taking their name from the fact that they combine quality with economy, Bassick's new sizes of swivel and rigid wrought-steel casters are designed with the quality features of Bassick "H-99" series casters and quantity produced for economy.

The Qualecon casters are ideal for platform trucks, portable lifts, conveyors, stock trucks and much other equipment where total loads range between 1000 and 2000 lbs. for hard wheel casters or 600 to 1200 lbs. for soft wheel casters.

THE BASSICK COMPANY
BRIDGEPORT 5, CONN.
IN CANADA:
BELLEVILLE, ONT.

Symbol of SW Excellence Bassick A DIVISION OF STEWART-WARNER CORPORATION

For more facts circle 585 on Reply Card

THE TRAFFIC PLAN THAT HANGS FROM THE CEILING

in the new GUTH KOLORKODED* industrial fixtures

*Copyright and U.S. and Can. Pats. Applied for

A completely new idea for industrial lighting—a dual-role fixture. First, it delivers the higher footcandle ratings recommended by the Blackwell report . . . and maintains glare-free lighting at the working level.

Second, the built-in traffic lights—red, yellow or green—create lines of color that direct and protect your workers.

These new streamlined Wyteliners® are also available without KOLORKODE for general illumination areas.

Both types banish ceiling shadows and provide comfortable shielding: 10% uplight with 13° cut-off or 25% uplight with 27° cut-off. For 430, 800 or 1500 M.A. operation. Designed for easy maintenance, too!

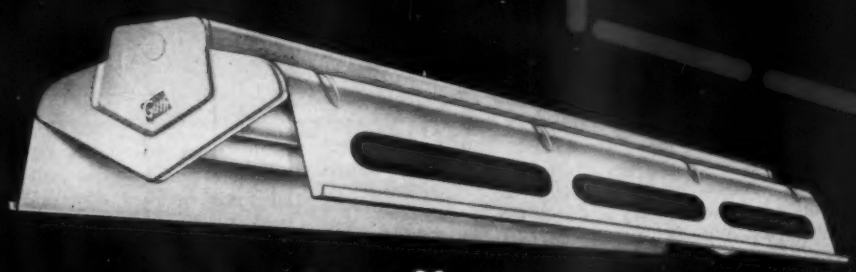
WRITE FOR FREE KOLORKODED BROCHURE

Guth LIGHTING

THE EDWIN F. GUTH CO.
ST. LOUIS 3, MO.

TRUSTED NAME IN LIGHTING SINCE 1902

standard porcelain reflector units, without KOLORKODE, for general lighting are RLM listed.



Green for GO
Yellow for CAUTION
Red for STOP

Available in three reflector finishes—Permalux White, Porcelain or ALZAK Aluminum.

ALSO, A COMPLETE LINE OF QUALITY BRASCOLITE INDUSTRIAL INCANDESCENTS

30°, 60° and 90° High Bays with or without uplight

Low Bays

Mercury Vapor units with or without uplight

For more facts circle 586 on Reply Card

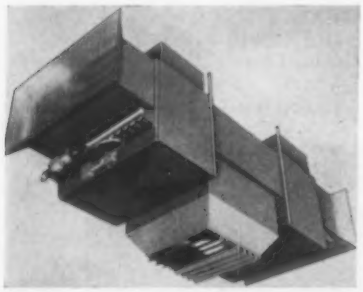
NEW PRODUCTS AND PROCESSES summarized for your convenience

Edited by M. E. Heniken

Reader Service Cards on pages 235-236 make it easy to get further information on any of these products. Just circle the item numbers of the products you would like to know more about.

1—GAS HEATER solves high level heating problems

Heating problems of building with high ceilings or obstructions can be overcome with the Downflow, according to manufacturer of this direct-fired gas heater. It is designed for installation even 40 ft above floor level, a



height which will clear most craneways and other handling equipment. Four basic sizes provide 300,000 to 600,000 Btuh, and the units can be installed in multiples for even greater capacities. The heater consists of duct furnaces with automatic controls, a large propeller-type fan assembly, and screened bell-mounted intake boots. Standard specifications include aluminized steel heat exhangers and on-off gas valves with 115 or 230-v controls. Louvers adjust. Form SA5904 gives details. Reznor Mfg. Co.

2—NUT RUNNER has speed, power for big jobs

For tightening and removing nuts on bolts from 6 to 12 in. diam. the Size 599 Super Slugger Impactool is claimed to have four times the slugging power of other wrenches. Since it is handled by a hoist or crane, it is designed for easy positioning with eye-bolt suspension for vertical or horizontal use. Equipped for two-man operation, this tool has a reversible motor and ball and cam impact mechanism. It runs with free speed of 330 rpm, delivers 500 blows per minute when impacting. It weighs 599 lb, is 37½ in. long, has a nose diameter of 11¾ in. Specifications are in Form 5226. Ingersoll-Rand Co.

3—HAND CLEANER is improved lanolized product

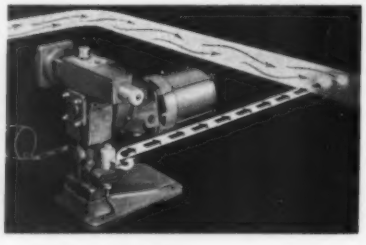
Lan-O-Kleen Plus is a three-way improvement over this company's original Lan-O-Kleen. It is described as offering a softer scrubbing action that doesn't roughen skin; a gentler sudsing action that doesn't wash away natural skin oils; a new fresh fragrance; and a rich lanolin content that soothes and softens hands. Lan-O-Kleen Plus is made by a process which impregnates ingredients into finely ground corn meal particles. In washing, these particles are said to have a gentle, sponge-like action that soaks up the potential skin irritants. West Chemical Products Inc.

4—COOLANT for abrasive cutting operations

Containing Odormask, a deodorant. Campbellene is a cool-blue coolant concentrate formulated for use with all makes of abrasive cutting machines and most grinding operations. According to manufacturer, the cooling agent keeps abrasive wheels clean and sharp, speeds chip settling, improves cut quality, minimizes odor, does not foam, inhibits rusting of machine and parts, retains effectiveness for long periods of heavy production. Being chemical in nature, it will not support bacterial growth and cannot turn rancid, it is noted. American Chain & Cable Co., Inc.

5—METERING PUMP is compact, packless unit

The Pneumatic Stroke Controlled McCannameter automatically proportions chemicals to any main line flow, it is announced. Utilizing its pneumatic stroke controlled instrumentation, the pump is designed to maintain a constant discharge in pro-



portion to the main line flow. Operating on a 3 to 15 psig air signal, the instrument requires no additional power source of air, responds instantaneously to eliminate backflash and keep chemical-discharge-to-flow ratio accurate, manufacturer states. Hills-McCanna Co.

6—ACOUSTICAL CEILING with fire protection feature

Significant properties of fire protection to public buildings are announced for Acoustical Fire-Guard. According to manufacturer, it is the first acoustical tile ceiling to gain a 2-hr fire retardant time design rating in UL tests. It is designed to provide fire protection for structural steel members and the floor or roof assembly under which it is installed. Acoustical Fire Guard, even combined with minimum floor construction, is claimed able to resist transmission of heat up through the assembly for at least 2 hr.

Manufacturer reports that Acoustical Fire-Guard can be suspended di-

rectly from bar joists or carrying channels, and requires only a 10-in. air space between structural floor or deck to meet qualifications for the 2-hr rating. The ceiling itself serves as a fire protective membrane for the floor structure above and, at the same time, provides an attractive sound absorbent interior finish for the room below. Heart of the system is densely packed mineral fiber tile. Interlocking tiles rest on clip splines which are snapped onto steel main runners. These are installed on 12-in. centers and clipped to bar joists or carrying channels. Armstrong Cork Co.

7—CONDENSERS sized to meet refrigeration needs

Components, condensing coils, casing sections and spray equipment of these evaporative condensers are organized and sized as a line of standard units that can be assembled as machines

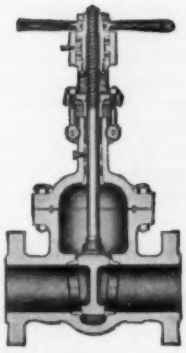
Replaced leaking valves with Crane gates
No leaks...no maintenance...in 2 years

New gate valves, installed on steam lines to and from a fire-watch pump at a gasoline plant, leaked continually, almost from the day they were installed.

When frequent maintenance failed to stop the leaks, Crane steel wedge disc gates were installed. One valve was a 3-inch, 300-pound No. 33XR; the other one, a 4-inch, 150-pound No. 47XR—both rated for steam service at a maximum temperature of 850° F. Both valves have Exelloy discs and stems, and replaceable No. 49 Nickel Alloy, screwed-in body seat rings.

The switch to Crane valves was made two years ago. Since then, they have been in continuous operation. Not *one* leak has developed—and not *one* cent has been spent for maintenance.

Get the jump on your costly maintenance problems. Make original as well as replacement installations with Crane valves and other piping materials. For all facts about the many Crane valves used for refinery, pipeline and other services, see your Crane Representative or write to the address below.



Typical cross section of Crane steel wedge disc gate valves widely used in refinery, power and process services. Available in sizes up to 48 inches; for oil or oil vapor, steam, air, gas, gasoline, water and other services. In seven pressure classes—150-pound to 2500-pound, with temperatures to 1100°F. Choice of trim materials is most complete. Write for details.

CRANE® VALVES & FITTINGS

PIPE • PLUMBING • HEATING • AIR CONDITIONING

Since 1855—Crane Co., General Offices: Chicago 5, Ill. Branches and Wholesalers Serving All Areas

For more facts circle 587 on Reply Card

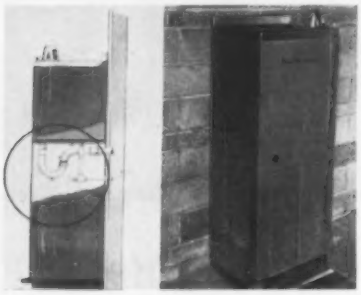
NEW PRODUCTS

(Begins on page 168)

to fit close to actual capacity needs of an existing refrigeration plant—or make provision for expansion according to load requirements. Applicable to either ammonia or Freon, condensers are available in sizes from 10 to 190 tons refrigeration capacity, in increments of 10 tons in each of the intermediate sizes, and in increments of 25 tons in sizes from 200 to 350 tons. All components are detachable. Niagara Blower Co.

8—WATER COOLERS "back up" to the wall

Installation flush against a wall is permitted with Wall Line Water Coolers. Plumbing lines are brought out of the back of the cooler and connected to lines concealed in the wall. The design allows for a standard trap with slip-type fittings to be installed inside the cabinet, without need for soldering or threading of



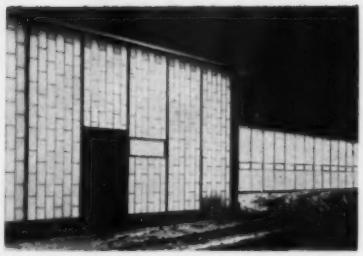
drain or trap fittings. The cooler extends but 12½ in. when flush against the wall, and the floor area required is 26 per cent less than for most cooler installations. Other features include a straight-through drain, high back-splasher and dual drink control providing finger-tip or toe-tip operation. Manufacturer also announces a Bilt-In Cooler, so compact it can fit in a space only 6⅝ in. deep, for mounting in a wall or under a counter. Westinghouse Electric Corp.

9—WIRE TOOL for stripping, looping, cutting

No adjustments are required with the T-6 Wire Stripper. It has six individual stripping holes, No. 16 through 26, and is intended for fast stripping of smaller gage wires. Holes on either side of stripping head can be used for looping stripped end of wire for screw-type terminals. Of hardened steel, this tool has plastic grips, is 6 in. long. Ideal Industries, Inc.

10—TRANSLUCENT WALL is inexpensive, dramatic

Walls of translucent buildings glow with a dramatic beauty at night when interior lights are turned on. During the daylight, they serve to reduce lighting costs by flooding interiors with soft, glareless light. This curtain wall system is composed of prefabricated panels finished on both sides with fiber glass-plastic sheets which come in six colors and can be decorated with colored inserts in the grid pattern (reinforced aluminum framework). The panels, 2¾ in. thick, are said to insulate as well as 8 in. of brick. Rapid and inexpensive installation is claimed for this wall system,



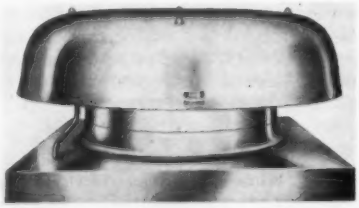
as the panels require no supports other than tracks which are ram-set in ceiling and floor. They are light enough to be handled by one or two men. In the installation pictured, four men enclosed 100 yds of wall in four days, it is stated. Kalwall Corp.

11—HIGH TEMP GREASE lubricates above 1000 F

Hi-Temp 2409, a 1000 F lubricant, is composed of an organic thickener, synthetic carrying agent and solid lubricant (fine particle graphite) which result in a product of grease-like consistency. The carrying agent usually burns after depositing the solid lubricant which forms a soft graphite on bearing surfaces. Loss of the carrier doesn't affect lubricity or other properties of the grease, says manufacturer. Hi-Temp 2409 is announced as a "production line lubricant" available at a "realistic price" and having broad industrial application, including use as kiln car lubricant. Hi-Temp 2409 can be applied manually or pumped through automatic lubricating equipment. E. F. Houghton & Co.

12—ROOF VENTILATOR is low and light

Only 30-in. high from curb to top in the largest size, Model QD is a direct-drive propeller ventilator, built in 16 to 48 in. diam, with capacities from 1,200 to 38,350 cfm. Manufacturer notes that due to aluminum



construction of top cap, face and propeller, the largest of these ventilators weighs only 485 lb, crated. Power assembly is supported on four vibro insulators to eliminate magnetic hum and vibration. Automatic or motor-operated louvers are available, as well as prefabricated steel curb base. Loren Cook Co.

13—LIQUID COATING provides roofing protection

Fibre Glass Supercote contains millions of glass fibers that interlock to give a roof a "blanket of glass." Chemically inert, these glass fibers do not absorb roofing oils but serve to keep them live and working. According to manufacturer, 5-yr laboratory exposure tests show no cracking, blistering or drying out with this coating. It is said to resist heat (won't pull away from seams in hot weather) and cold, and to withstand chemical vapors and industrial fumes. It is applied with roofing brush or squeegee over old or new roofs of felt, composition, concrete, tin, or corrugated materials. No heating is required. It is pointed out that the coating also contains a penetrating sealer, so roof repairs can be made in damp weather. The Garland Co.

14—PLASTIC DRAIN PIPE conforms to trench bed

Because of its flexible plastic composition, Dur-X conforms to trench beds and contours. It is described as about ⅛ the weight of ordinary cast iron pipe and is available in 10-ft lengths in sizes from 2 to 6 in. Applications include industrial non-pressure waste disposals, foundation drainage. This plastic pipe is reported to offer good impact strength and resists corrosion by soil and sewage acids, and its smooth finish guards against clogging, and scaling. The pipe is assembled with solvent cement, can be cut with a hand saw. Franklin Plastics, Inc.

15—INSULATION stops condensation on cold lines

Now in slipon form, Clocel Tubing Insulation is designed to keep condensation on cold lines and provide excellent thermal insulation for cop-

For maximum diffused, low-cost daylighting use Johns-Manville Fiber Glass *Corrulux*®

•

the translucent building panels that defy breakage

Shatterproof Johns-Manville Corrulux translucent building panels are the modern answer for new construction or modernization of industrial and commercial buildings. These versatile and colorful fiber glass-reinforced building panels offer many advantages when used for skylighting, sidelighting, glazing, partitions, awnings, decorative panels . . . and many more applications.

Translucent—Corrulux diffuses daylight, cuts glare, admits more usable light. Provides evenly lighted shadowless areas.

Shatterproof—Corrulux does away with the expense and hazard of window breakage, withstands vibration, vandalism, hailstones, accident impacts.

Economical—Because of its efficiency Corrulux can pay for itself in savings in artificial lighting and lower cost indoor daylighting. Corrulux makes possible low-cost modernization of old buildings. Corrulux resists the effects of most industrial fumes. Maintenance costs are reduced to a minimum.

Colorful—Corrulux is decorative, adds bright color accents. Built-in colors are an integral part of the panel.

Structural Strength—Corrulux is amazingly strong, yet light in weight.

•

For complete specifications and samples, see your J-M distributor or write: Johns-Manville, Box 158, New York 16, N. Y. In Canada, Plastic and Allied Building Products, Ltd., Box 250, Dundas, Ont.

JOHNS-MANVILLE

JOHNS-MANVILLE JM PRODUCTS

For more facts circle 588 on Reply Card

NEW PRODUCTS

(Begins on page 168)

per tubing carrying hot, cold, or chilled water, or other liquids or gases. K factor of this closed cellular nitrogen-filled insulation is given as 0.28 at 75 F, and is said to remain constant. Effective temperature range is 0 to 200 F. This tubing resists water and moisture indefinitely, while providing the thermal qualities of entrapped nitrogen, says manufacturer, and its light weight and soft resiliency make it easy to install—you slip it over fittings and seal with suitable adhesive at joints. Clocel comes in standard copper tubing sizes from ⅜ to 3⅛ in. ID. Five wall thicknesses range from 3/16 to ¾ in. Insul-Coustic Corp.

16—SINGLE CASE BALLAST is cooler, quieter, lighter

No. 6G1200 is announced as a single-case ballast for PG, VHO and SHO fluorescent lighting that is cooler, quieter and nearly 7 lb lighter than present two-section models. For 120-v operation of two 72- or 96-in. power groove, VHO or SHO lamps, this ballast has an 18⅝ in. mounting dimension and eliminates need for mounting and interconnecting two separate sections. Units give reliable starting of 72-in. lamps down to —20 F and 96-in. lamps down to 50 F, according to company. Heat tests of the new ballast are reported to indicate case temperature below 90 C when operated in a typical two-lamp surface-mounted industrial fixture without use of auxiliary heat dissipators. General Electric Co.

18—METAL PADS protect stock in lathe jaws

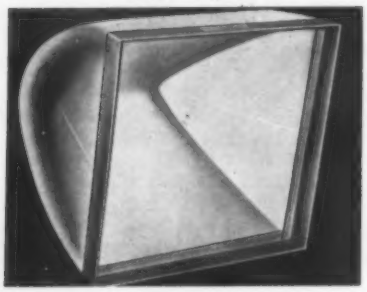
For use on vise and lathe chuck jaws to eliminate marring of stock, Magnapads are of soft metal that conforms to the contour of the stock—gripping it fast without marring it. Alnico magnets hold the Magnapads in place on the jaws. Set-up requires no extra help, says manufacturer, and is simpler because the magnets hold these pads in position. Magnapads come in sizes for vises 3 to 5 in. wide in lead, aluminum, soft or hard brass. Magnapads for lathe chuck pads are obtainable in soft copper with attached magnets in 45° and 90-deg shapes. Miller Pattern & Mfg. Co.

19—FLOOR TOPPING withstands corrosion, traffic

Chemi-Top is suggested for plants having severe floor-corrosion problems. According to manufacturer, Chemi-Top is a dense, non-porous surfacing compound that withstands impact, wear, and corrosive action. Being chemically inert, this topping is unaffected by salts, oils, alkalis, grease, solvents and most acids, it is pointed out. Applied ⅛-in. thick, it bonds to concrete, metal or wood. A Chemi-Top installation is said to set up for foot traffic overnight, and for heavy wheeled traffic over a weekend. ChemiTop can be applied 1/16-in. thick for protective surfacing of tank linings, drains, walls, benches and metal surfaces. The Garland Co.

17—BAG TYPE FILTER is disposable, parabolic shaped unit

The Arco B/T Pure-Air Filter is reported to offer higher air-cleaning efficiency, greater dust-holding capacity and low initial resistance at a modest cost. It is described as the first parabolic shaped disposable bag type filter specifically engineered for air-conditioning, heating and ventilating systems. Filtering action is strongest where dust particles are finest; air flow is strongest where accumulation of large dust particles is greatest. Least resistance to air flow is at the back of the bag, gradually increasing up the sides.



The filtering material has upstanding fibers on its surface, which help to promote formation of a pervious filter cake. As this builds up, the air stream hits it at an angle, breaks it off and carries it to the back of the bag. Among advantages claimed for this filter are adaptability to low or high velocity systems, simple and economical installation. Due to the filter's light weight, supporting devices aren't required. Arco Mfg. Corp.

20—ELECTRIC COUNTERS tally pairs and quads

These pulse grouping electric counters are designed to count pairs, quads and other group quantities without pulse divider circuits. One designed to count pairs (one count for two pulses), for example, accumulates one pulse and then registers one unit count on the second pulse. Five

number wheels register unit counts. A sixth wheel (not shown) can be arranged to register accumulated partial counts. Counters come in knob reset basemount, knob reset panelmount and key reset panelmount models for a-c or d-c use, standard voltages to 150. PIC Automation Controls Div., General Controls Co.

21—WARMING DEVICE for 55-gal steel drums

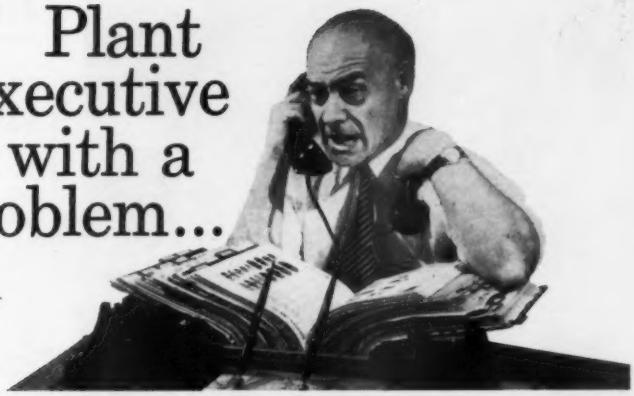
For applying heating or cooling to conventional 55-gal steel drums, this warmer consists of a single-embossed Platecoil with clamp and flexible connections to permit rapid change from one drum to another, or changing location on an individual drum. Handles are insulated. The flexible

connections can be connected to steam lines, hot or cold water or other refrigeration source to add or withdraw heat from contents of the barrel. The warmer costs around $140.00 with hoses, $106.00 without. Platecoil Div., Tranter Mfg. Inc.

22—TAPPING-CUTTING OIL in aerosol container

Aerosol Jet Cutting Oil is claimed to answer all needs for a heavy-duty tapping and cutting oil where there is no built-in lubricating system. It is packaged in aerosol spray cans in a handy-carrying 6-oz size as well as a 16-oz economy size. Company says

Plant executive with a problem...



Edwards modern signaling systems can make him smile again!

If it's an industrial control, communication or protection problem, better days are on the way! All he has to do is hang up one of those phones and call his nearest Edwards electrical distributor. It makes sense to check the advantages inexpensive Edwards signaling systems provide industrial plants in efficiency, safety, and maintenance savings. And there's no better time to do it than plant modernization time. Why not call *your* Edwards distributor today. He will be glad to survey your plant and recommend the signaling products that can best solve your own particular problems, and make your plant a safer, more efficient, more economical operation. His services are fully backed by Edwards technical representatives in all major cities.

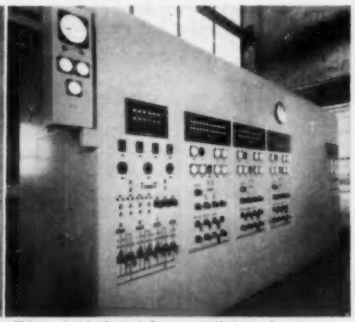
And while you're at it, ask him for your copy of the Edwards Industrial Signaling Log—a concise, informative booklet covering all aspects of industrial signaling products and what they can do for you.

Strategically located manual coded stations combined with ceiling-mounted, automatic fire detectors provide 24 hour protection.

LOKATOR master selector unit—installed convenient to regular switchboard for ease in paging key personnel.

Program unit of an Edwards Clock and Program System. Your own personnel can change schedules in a matter of seconds.

Industrial chime for plant paging, installed below Edwards clock.



Edwards industrial annunciators in power plant, with remote reset feature.

CONTROL • COMMUNICATION • PROTECTION

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Before pilferage gets out of hand . . . call

THE ANCHOR MAN—

expert in industrial protection

Pilferage—vandalism—trespassing—if one or more of these is a problem at your plant, put in a fast call to your Anchor Man. In a few minutes he can show you the many ways Anchor Fence is engineered for protection. For instance, how Anchor's exclusive square terminal posts give you added security by removing potential toe and hand holds. His visit could save you thousands of dollars in property losses and law suits this year alone.

Call your local Anchor Fence office today. Ask for the Anchor Man who specializes in your type of plant. For informative literature, write: ANCHOR FENCE, 6661 Eastern Ave., Baltimore 24, Md.

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Plants in Baltimore, Maryland; Houston, Texas; and Whittier, Cal. Sold direct from factory branches and warehouses in all principal cities.

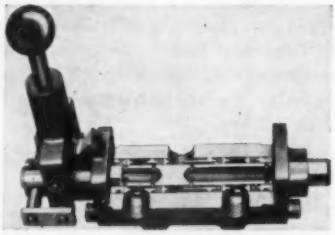
For more facts circle 590 on Reply Card

(Begins on page 168)

the oil is approved for use on soft to hard metals and that it clings to metal in any position—won't drip or run off. Principal uses are in maintenance jobs around the plant. Oil comes out in a finely directed jet stream; for sawing metal, it can be jetted along the cutting line. Crown Industrial Products Co.

23—HYDRAULIC VALVES are single piston type

Unique feature of Durable Seal Valves, as reported by manufacturer of these single piston hydraulic operating units, is that the same line pressure acts both inside and outside the U-cup seals at all times during the operating cycle. Thus, seals are



floated across ports without distortion, shear or undue wear, it is noted, and there is no distortion of the stainless steel piston or of the pedestals which position the U-cup seals. The result is claimed to be low upkeep, long valve life, positive control and easy operation. Available in sizes from ½ to 2 in., in three- and four-way types, and up to 6 in. in the two-way or spray valve type, Durable Seal Valves are made with screwed or flanged pipe connections, for direct hand operation or a variety of remote controls. They are cast in bronze or steel for working pressures to 2000 lb. Reference Book 39-6 gives details. Homestead Valve Mfg. Co.

To receive product data circle item numbers on the handy Reader Service Cards provided on pages 235-236.

24—TUBING shrinks into fit over shapes, rods

Irvington Tubing No. 3024 shrinks under heat to afford a tight, abrasion and chemical resistant electrical insulating cover for symmetrical or gently contoured shapes, bars, tubes

The Image of CF&I offers . . . for every industry . . .

Wissco Woven Wire Processing Belts

The giant steelman reflects generations of steel-making experience that results in durable, more efficient steel products for industry. For processing and conveying purposes, CF&I-Wissco Woven Wire Metal Belts offer these advantages for friction or chain edge drives:

Open Mesh—Allows free drainage—permits free air circulation for fast, uniform heating and cooling.

Strength of Metal—Fabricated to specifications in plain, tinned, galvanized, stainless or special alloy steel, Wissco Belts provide long, trouble-free service.

Corrosion Resistance—You can select a steel belt—high carbon, galvanized or stainless—which minimizes replacement costs and reduces maintenance.

These advantages mean long operating life and increased production for you, and make Wissco Belts a "must" where temperature extremes and every day wear factors are severe. You'll find that Wissco Belts are ideal for baking, cooling, drying, degreasing, spraying and washing.

If your operation uses temperatures 800° to 2100°F and higher, specify Wissco Alloy Steel Belts. They are furnace-tested to assure dependable, smooth performance, and are excellent for annealing, hardening, enameling, sintering and similar operations.

In addition, special alloy Wissco Lehr Belts with flat supporting surfaces are available for glass annealing and decorating.

Call our experienced representative today for complete information on the Wissco Belt that will best fit your manufacturing process. And remember, Wissco Belts are usually shipped on reels for fast, simplified installation.

WISSCO BELTS
THE COLORADO FUEL AND IRON CORPORATION

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"GOOD FROM THE FIRST DROP"

..Steam Traps ready to go again with a

B-J Cage Unit

The moment you drop a B-J cage unit replacement into a faulty steam trap — it's good again . . . renewed and ready to go to work. Now there's no reason for prolonged shut-down while you repair imperfect traps. You simply:

- **REMOVE** the cap right on the line
- **REPLACE** the interior with a B-J cage unit
- **RECAP** the trap assembly
- **RENEWED** . . . all new and ready to go

It's as easy as replacing a light bulb and the cage unit element is always where it belongs for rapid response to trap conditions. For in this modern unit, a quick-action, completely accurate bellows is combined with a perfect-fit plug and seat, then enclosed in a sealed monel cage. And there may be no need to dispense with your present steam trap investment. B-J industrial cage units can probably be installed in your present thermostatic traps or used in a complete B-J system.

For the complete story on steam trap functions and maintenance — write today for "The Steam Trap Primer". You'll see the 'hows' and 'whys' of steam trap performances. And perhaps you'll see how B-J cage units can end your steam trap problems.

"Be Wise . . . Be Sure . . . B-J"

BARNES & JONES, INC.

34 Crafts St. • Newtonville 60, Massachusetts

For more facts circle 592 on Reply Card

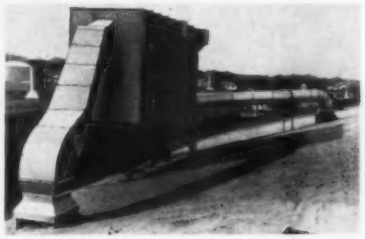
NEW PRODUCTS

(Begins on page 168)

or rods, manufacturer announces. Typical applications for this heat reactive tubing include insulation and protection of harness cables, condensers, coils, bus bars, large transformer leads, tool handles. It is made under a process which pre-expands the tubing; under heat, it quickly (4 to 8 min at 300 F) shrinks to normal dimensions. Furnished in continuous lengths, this tubing is reported to have an electric strength of 1000 v in 0.016-in. thicknesses, tensile strength of 3200 psi, ultimate elongation of 300 per cent and a cold brittle point of —20 C. Irvington Div., Minnesota Mining and Mfg. Co.

25—AIR FILTER offers complete dust recovery

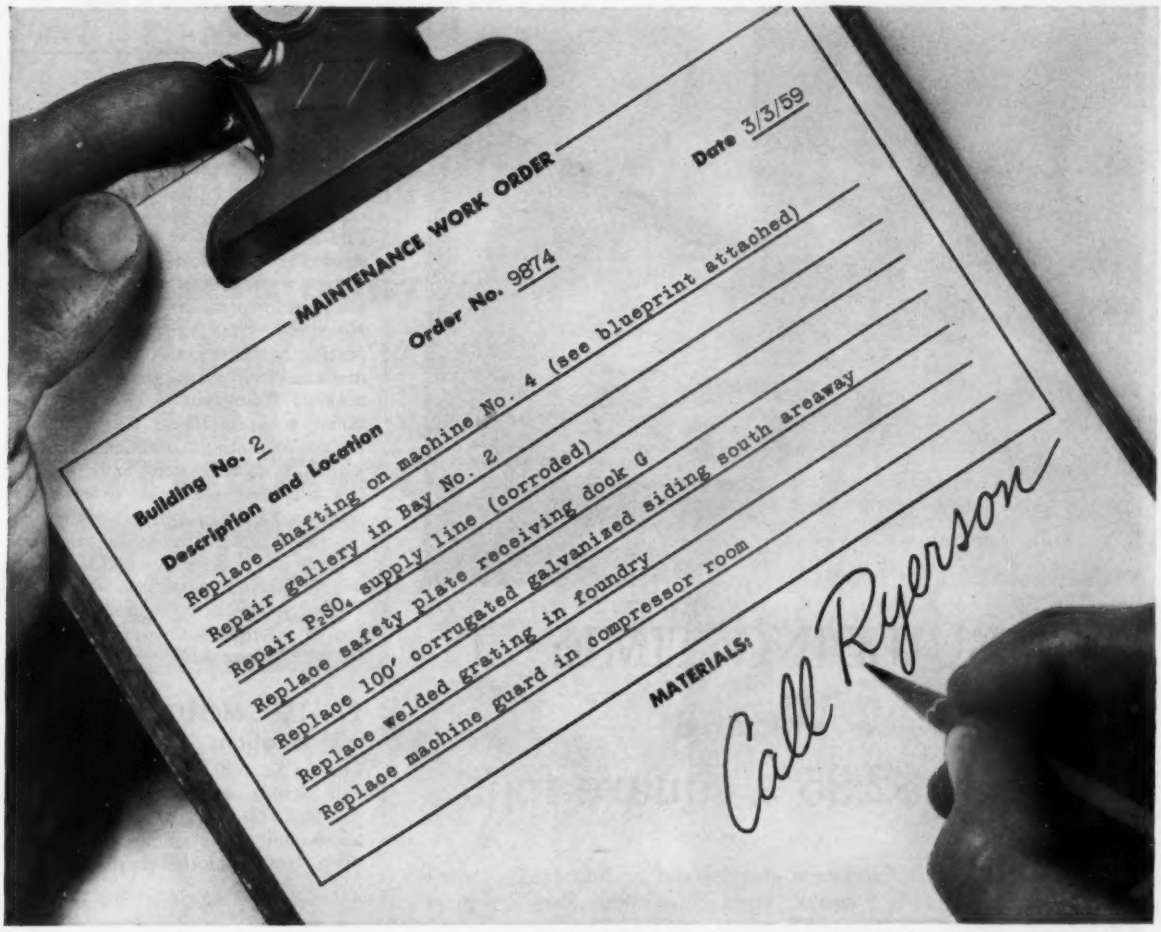
Cleaner air, reduced machinery maintenance, and salvage of valuable dusts are advantages claimed for the Dustkop Filterkop, developed for operations involving a high volume of air



to be handled. Used in conjunction with standard vented Dustkops, the Filterkop is designed to receive all air collected by these units, recover nearly 100 per cent of dust load, dissipates fumes, and recirculates cleaned air. Basic unit consists of heavy gage steel housing, hopper, 80 cloth filter tubes, and shaker mechanism. Accumulated dust is automatically shaken from tubes into hopper at end of each fan operation. Depending upon plant requirements, Filterkop may consist of a single unit or any multiple. Aget Mfg. Co.

26—PACKAGED BOILER for high temp hot water use

In the Flo-Kontrold, water is circulated at temperatures between 250 and 450 F with system loads from 4 to 100 million Btu/hr, it is announced; yet this packaged boiler is basically simple, covers a wide range of load requirements and requires only minimum maintenance. Circuits are arranged to eliminate possible


MAINTENANCE WORK ORDER
Date 3/3/59
Order No. 9874
Building No. 2
Description and Location
Replace shafting on machine No. 4 (see blueprint attached)
Repair gallery in Bay No. 2
Repair P_2S_0 supply line (corroded)
Replace safety plate receiving dock G
Replace 100' corrugated galvanized siding south areaway
Replace welded grating in foundry
Replace machine guard in compressor room
MATERIALS:
Call Ryerson

...for all maintenance steel needs

Cold Finished Shafting—Ryerson stocks of t g & p bars provide a ready source for shafting of outstanding size accuracy, straightness and concentricity.

Expanded Metal—Ryex® expanded metal—light, strong, rigid . . . easy to handle—all sharp edges removed. Two types: standard and flattened.

Stainless Pipe and Tubing—on hand in a complete range of types. Valves plus welding and screwed-type fittings also available.

Galvanized Sheets—a wide range of gauges and sizes. Controlled galvanized process provides tight coat of spelter. Sheets stand forming without cracking. Cut or corrugated to your order.

Safety Plate—Inland 4-Way® Safety Plate in two pattern sizes for flooring, stairs, ramps, platforms. Provides plenty of traction. Easy to install, maintain.

Welded Grating—stock-size panels, or tailor-made for your job with all necessary cutouts and banding. Furnished galvanized or painted.

Perforated Sheets—standard patterns in stock; special patterns perforated to order. Available in carbon steel and stainless sheets or plates.

Let Ryerson carry your inventory

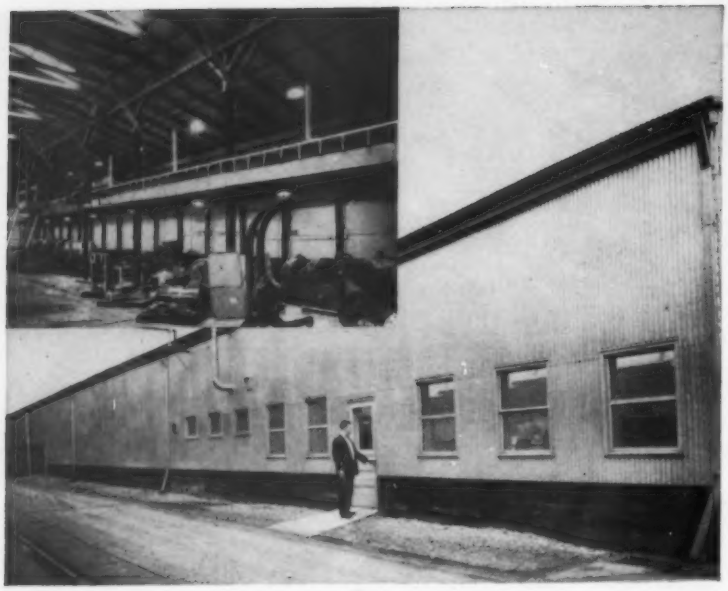
These and all other maintenance steels cut to your most exacting specifications—are available from the world's largest stocks at Ryerson. Save time, money, space . . . help your maintenance crew finish faster and have more time for preventive maintenance. Call Ryerson.

RYERSON STEEL®
Member of the INLAND Steel Family

STEEL • ALUMINUM • PLASTICS • METALWORKING MACHINERY

NATION'S MOST COMPLETE SERVICE CENTERS IN PRINCIPAL CITIES COAST TO COAST

For more facts circle 593 on Reply Card



BUILDING TIME:
7 Weeks
COST: $2.95 a square foot

This 56 ft. x 234 ft. industrial storage and maintenance repair shop was built in only 7 weeks. It provides office space and has a 15 foot balcony on either side. Siding and roof are corrugated aluminum. The floor is concrete.

Because it was built with Koppers Poles, pressure-treated against decay and termite attack, this building will stand for generations with practically no maintenance.

Koppers pole-type buildings cost ⅓ to ½ less than conventional structures . . . go up fast . . . are strong, sturdy, enduring. Before you build, investigate Koppers pole-type construction. Mail the coupon today for complete information.

C-25

Wood Preserving Division
KOPPERS COMPANY, INC.
786 Koppers Building, Pittsburgh 19, Pa.

Please have a Koppers Qualified Contractor call on me.

NAME _____ TITLE _____
COMPANY _____
ADDRESS _____
CITY _____ ZONE _____ STATE _____

KOPPERS **POLE BUILDINGS**

For more facts circle 594 on Reply Card

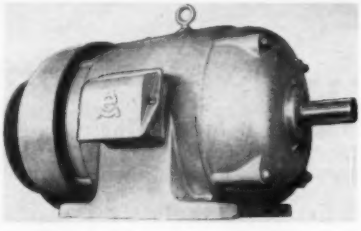
NEW PRODUCTS

(Begins on page 168)

vapor locking as there are no reverse vertical down flow tube circuits. All circuits are drainable at one point through the bottom header, and vented through the top header. The Flo-Kontrold is supported on a structural steel frame and enclosed with a welded steel casing, designed gas-tight for pressurized furnace firing. No special foundation or brick supporting construction is required, says manufacturer. Circulating pumps are optional equipment as pressure drop boiler is from 10 to 15 psi under normal operating conditions. System make-up water is reportedly only a fraction of 1 per cent, so make-up water is handled with a minimum of auxiliary equipment. Specifically developed for high temperature hot water heating or process work, the Flo-Kontrold may be fired with oil, gas or combination oil/gas, or coal. Boiler Engineering & Supply Co., Inc.

27—TEFC MOTOR for lint-filled locations

For textile mill, cotton gin, oil mill and similar applications, this totally enclosed, fan cooled motor features a smooth self-cleaning frame. An open fan shield design permits free



movement of lint to prevent its hanging up on the air openings and the externally ventilated construction serves to keep lint from working into motor windings or interfering with cooling. The fan directs the air flow over the smooth aluminum alloy housing to give a cooling and self-cleaning action and eliminate need for separate cleaning by compressed air. Section 1, Bulletin 59-9 gives full information. Electra Motors, Inc.

28—LIQUID LEVEL CONTROL is probe type unit

This liquid level controller is made with single or dual fittings and with extensions of 1, 3 or 5 ft. The probes provide a complete liquid level control when used in conjunction with electronic or transistor relays. Since

DRY YOUR OILS.....

AT LESS COST WITH

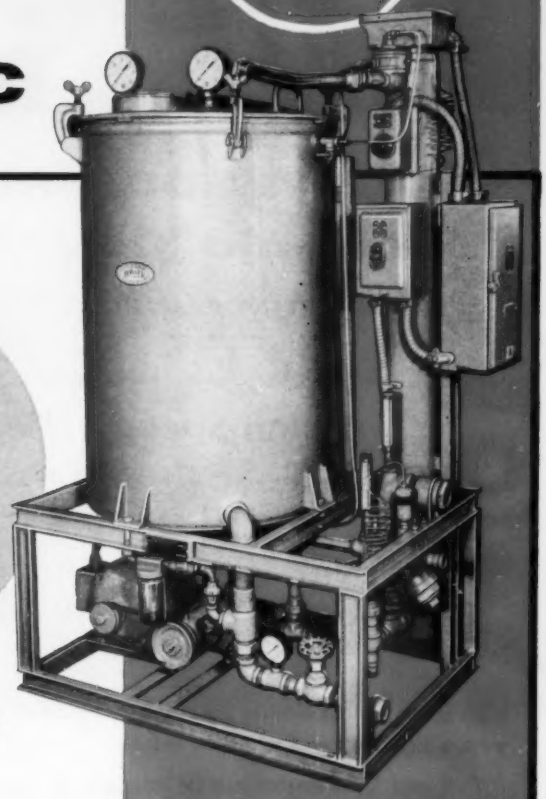
NEW

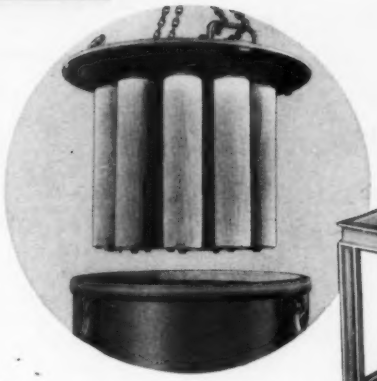
FIL-THERMO-VAC

by BOWSER ESTABLISHED 1885

LUBRICATING...
INSULATING...
COOLING...
HYDRAULIC...

- petroleums
- synthetics
- vegetable
- animal
- fish





Oil disperses through fiberglas micro-filters into vacuum chamber where water and other volatiles are drawn off . . . condensed and ejected.

LOW COST!

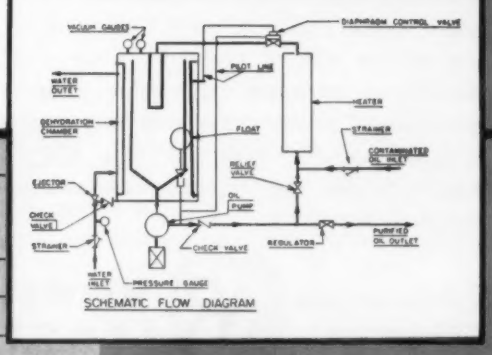
Automatic self-policing "package system" costs less, does better job than any other method. It will pay to get the facts!

BOWSER, Inc.

FORT WAYNE, INDIANA

REGIONAL, DISTRICT AND SALES OFFICES:

Albany • Atlanta • Boston • Buffalo • Chicago • Cleveland • Dallas • Detroit • Fort Wayne
Houston • Kansas City • Los Angeles • Milwaukee • Minneapolis • New Orleans
New York • Philadelphia • Pittsburgh • St. Louis • San Francisco • Seattle • Tulsa



SCHEMATIC FLOW DIAGRAM

BOWSER, Inc. DATE_____
FORT WAYNE, INDIANA

Gentlemen: Send FACTS ABOUT FIL-THERMO-VAC to:

Name_____

Company_____

Address_____

City_____ State_____

For more facts circle 595 on Reply Card

New VEEDER-ROOT Electronic "Count-Pak"*

A COMPLETE COUNTING PACKAGE!

High Speed...Electric Eye ..."Pulse Stretcher" ...Instant Reset

First of a new series of electric and electronic counting "packages" is this Model C "Count-Pak" . . . consisting of the new V-R instant-reset, high-speed (3,000 counts per minute) electric counter combined with a light source and photo cell.

Cell and light source can be adapted to any application . . . and are permanently assembled so vibration can't jar them out of focus. Pulses as short as .0002 seconds will actuate this device, which means that a ¼" object or space moving at 6,000 feet per minute will be counted. "Count-Pak" is transistorized throughout (no tubes) and utilizes printed circuits . . . double assurance of instant action and long trouble-free life. Rugged, compact case: 8¼" wide; 5¼" high; 6¼" deep. Panel includes pilot light, reset button, and power switch. *And prices are unexpectedly low.* Write:

Everyone can Count on

Veeder-Root INCORPORATED

HARTFORD 2, CONNECTICUT

Hartford, Conn. • Greenville, S. C. • Altoona, Pa. • Chicago
New York • Los Angeles • San Francisco • Montreal
Offices and Agents in Principal Cities

*Trade-mark registration applied for.

For more facts circle 596 on Reply Card

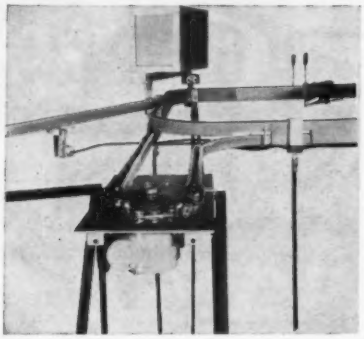
NEW PRODUCTS

(Begins on page 168)

these probes have no moving parts they will not fail to operate due to sticky floats, manufacturer states, and they are unaffected by normal changes in temperature and pressure and by the consistency of the liquid. Other features include stainless metal parts, Neoprene rubber splash hoods. Cutler-Hammer Inc.

29—CONVEYOR SYSTEM has route selector head

Power-Flex is a power and free overhead conveyor system designed to handle light, medium and heavier loads up to 600 lb maximum per work carrier. A feature of Power-



Flex is the Telematic Route Selector Dispatch Head which can be furnished with each carrier. Two route selector dials on the head can be set to automatically guide a carrier to any one of 80 stations in the system. Power-Flex is suggested for transportation applications involving storage banks, manufacturing work stations, segregations or integration of work carriers or inventory. Columbus McKinnon Chain Corp.

30—STEEL SOLDER in paint-on paste form

For stainless steels, StainTin 157-PA is announced as a solder-type alloy, finely powdered and silver-bearing, suspended in a balanced liquid-flux composition. You merely paint the paste on the surface and apply heat, preferably indirect, until the alloy flows and bonds at approximately 450 F. StainTin 157-PA is claimed free of volatile elements such as cadmium and lead. Deposits are said to provide up to 15,000 psi tensile strength, depending on joint design. The alloy is oxidation resistant, says company, and remains shiny under normal corrosive conditions. Manufacturer recommends it for food con-

For more facts circle 597 on Reply Card ⟶

Photo Courtesy Milwaukee Gear Company

FOR EVERY APPLICATION, THERE'S ONE CRANE OUTSTANDING...

IN HEAT-TREATING: This 5-ton P&H crane with five-step speed control puts speedy material-handling under one man's thumb. From quench furnace to quench tank to tempering furnace, this low-cost standard-built unit provides dependable load movement — despite searing oil fumes, sudden blasts of heat from open fire-pots, and punishing high temperatures.

P&H units like this one are made with all the care and quality that go into any P&H crane, and because they are constructed from stock parts, you can have one on your runway for far less than you'd expect. What's more, every P&H crane is backed by a policy of undivided responsibility for all electrical and mechanical parts. This typical P&H service assurance is one reason why satisfied customers have made P&H the world's largest manufacturer of overhead cranes.

Write for your free, file-size copy of Bulletin C-6 "Industrial Cranes." Dept. 103, Harnischfeger Corp., Milwaukee 46, Wisconsin.

OUR 75TH YEAR

P&H HARNISCHFEGER

...quality and service for 75 years

Photo Courtesy Wacho Mfg. Co.

6000 ORDERS A DAY DON'T TIRE A ZIP-LIFT!

An operator's thumb punches over 6000 commands a day into this production-line P&H Zip-Lift in a painting, coating, and tinning plant. The sturdy hoist responds promptly . . . never tires . . . and comes up asking for more.

The control pendant on a Zip-Lift operates on a safe 24-volt circuit — typical of the many safety features P&H builds into this low cost unit. There are two brakes, either of which will hold a capacity load even if power fails . . . shrouded load-block to protect workers hands . . . limit switches that guard against equipment abuse . . . and many more features that make P&H Zip-Lift hoists extra-safe and extra-dependable.

Are you guarding your personnel and your production with P&H Zip-Lifts . . . or are you going to start with your very next hoist purchase? Bulletin H20 will help you plan that purchase. It's free from Dept. 202, Harnischfeger Corp., Milwaukee 46, Wisconsin.

OUR 75TH YEAR

P&H HARNISCHFEGER

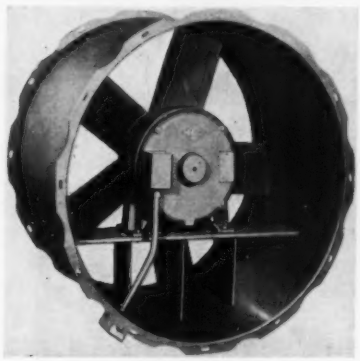
. . . quality and service for 75 years

(Begins on page 168)

tact applications. Other uses include sealing spot welded and wrapped seams, step soldering complex assemblies and filling holes, depressions, tool marks. StainTin 157-PA can be also used with steels, copper alloys and nickel alloys. Eutectic Welding Alloys Corp.

31—DUCT FAN can be mounted in any position

This tubeaxial duct fan can be installed as easily as a section of duct, company says, and uses no more space. Sixteen sizes cover capacities from 1040 to 21,200 cfm at static



pressures up to 1½ in. The unit can be mounted in any position. Smaller sizes feature a three-blade propeller; and the larger, a five-blade design. Fan wheels are directly connected to a totally enclosed motor with permanently lubricated ball bearings. Fan unit is mounted in a welded steel housing with flanged ends to form a completely prefabricated fan and duct section. Ilg Electric Ventilating Co.

32—SMALL DEIONIZER with resin refill service

The Junior 120 delivers up to 120 gal of deionized water per hour and is intended for applications not justifying a large deionizer, but too great for portable or cartridge unit capacities. For these, the compact (45 in. high) unit provides water claimed freer from mineral impurities than distilled water, and at a fraction of the cost of distillation. It delivers between 6300 and 8400 grains exchange or up to 1500 gal per cycle. No regeneration is necessary. Included with the Junior 120 is a service whereby removable bags of mixed ion exchange resin, when exhausted are lifted out and exchanged for factory regenerated refills. A built-in ohm

ONLY RAMSET

Spring-like action of compressed steel surrounding the fastener creates a vise-like bond, developing amazing holding power

Ramset holding power test conducted by The Austin Co., engineers and builders, Cleveland, Ohio

offers austempered fasteners with such superior holding power

Even under the most demanding workloads, Ramset's austempered Red-Tip fasteners assure more holding power and greater fastener strength. Austempering, Ramset's high-heat slow-quench treatment, puts extra strength, toughness and dependability into every Ramset Red-Tip fastener.

Ramset's wide variety of fastener sizes puts the *right* fastener on each job—you don't have to "make-do" with off-size pins or studs. Ramset assures positive, guaranteed fastenings into tough steel, concrete or masonry faster and easier, and at lower in-place cost. Consider Ramset's many advantages and the "100-for-100" guarantee—call your Ramset dealer (under "Tools" in Yellow Pages) for details.

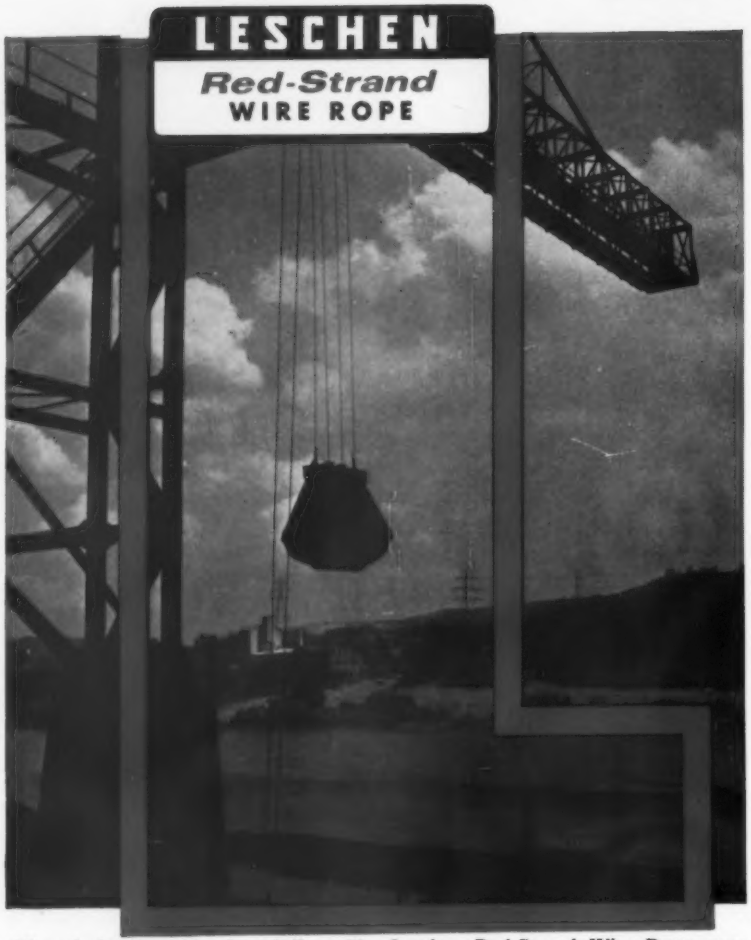
In addition to powder-actuated fastening, the versatile Ramset System includes Shure-Set® hammer-in tools for light fastening, and Ringblaster® heavy-duty kiln gun.

Ramset® Fastening System

WINCHESTER-WESTERN DIVISION • OLIN MATHIESON CHEMICAL CORPORATION
12133-E BEREA ROAD • CLEVELAND, OHIO

For more facts circle 598 on Reply Card

when the going gets rough-
give 'em "L"



When the load is on the clam shell, you'll be glad you rigged with *Leschen*—the wire rope that's the same top quality in every foot of every reel. The new Leschen wire mill is designed to deliver exactly that. New machines . . . new processes . . . exclusive new continuous-flow technique—all as modern as tomorrow. Try Leschen Red-Strand Wire Rope now and see how its uniform quality makes your operation safer, your replacement time farther in the future. Make your next order Leschen! *Leschen Wire Rope Division, H. K. Porter Company, Inc., St. Louis 12, Mo.*

LESCHEN WIRE PORTER ROPE DIVISION

H.K. PORTER COMPANY, INC.

DIVISIONS: Connors Steel, Delta-Star Electric, Disston, Forge & Fittings, Leschen Wire Rope, Mouldings, National Electric, Refractories, Riverside-Alloy Metal, Thermoid, Vulcan-Kidd Steel, H. K. Porter Company (Canada) Ltd.

For more facts circle 599 on Reply Card

NEW PRODUCTS

(Begins on page 168)

meter actuates a pilot signal when effluent resistance falls below 50,000 ohms. Spent material is then replaced with fresh ion exchange resin which the user keeps on hand. Bulletin 513 gives details. Elgin Softener Corp.

33—TEST SET comes in portable, bench models

This dielectric test set, 5 kv, 1 ma, with maximum output current 5 ma at output voltage up to 2.5 kv, is for step-voltage resistance tests, voltage withstand, breakdown, and 1-min resistance tests on insulation in electrical

equipment with voltage ratings in the 300, 600 and 2500 v classes. Applications include rotating electrical machinery, dry-type transformers, switchgear, capacitors and insulators rated 230, 440, 550 and 2500 v a-c and d-c; traction motors and generators rated 600 v, and wiring installations and cable with smaller conductor sizes and Code- or heat resistant insulation rated 600 v. The bench model is suggested for acceptance and proof test on electrical insulation systems for quality control in manufacturing and repair. The portable set, housed in a shock-resistant case, lends itself to field use for test of reconditioned equipment after installation, and in preventive maintenance of installed equipment. Further details are in Bulletin 22-5 52. James G. Biddle Co.

34—V-S PULLEY for new and existing equipment

For providing ratios up to 3 to 1 at 3⅓ hp at 1150 rpm, or 5 hp at 1750 rpm, the 3050 Variable Speed Pulley is designed to install easily and to change speed instantly with just fingertip pressure while machine is in motion. Both pulley faces move simultaneously and equally for constant belt alignment, each side actuated by

its own spring, company explains, and curved pulley faces maintain full contact with belt sides. The pulley uses 1-13/16-in. top width variable speed belt. Four standard bores range from 1 to 1⅜ in. with 3½-in. bore length. Full range motor travel is 4⅝ in. with 9.53-in. maximum and 3.17-in. minimum pitch diameters. Lovejoy Flexible Coupling Co.

Use the Reader Service Cards provided on pages 235-236 to ask for more information on these products. Circle item numbers of products in which you are interested.

35—STATIC DEVICE controls, shows temperature

Combining magnetic amplifier and transistor circuitry, the Type 701 Limitemp is an indicating temperature controller designed for the range of 100 to 400 F. Accuracy for temperature control is given as ±3 F about the level selected; accuracy for indication by meter reading, ±6 F. An indicating lamp signals when controller is functioning to restore temperature to level desired. Applications

include monitoring temperatures of bearings, windings of large motors and other electrical equipment, and materials in process. Power output is 5 w at 24 v, d-c. Device senses temperature through standard copper temperature detectors having a resistance of 10.00 ohms at 25 C. Rated power input is 115 at 60 cycles. The Type 701 Limitemp costs under $150. Westinghouse Electric Corp.

36—AIR VALVE is pneumatically operated

Pneumafoil, a high velocity air valve, operates by a 15 psi pneumatic control system; no motor or linkage mechanism is used. Each of Pneumafoil's aluminum airfoil-type vanes en-

SEE FOR YOURSELF HOW

OSPHO®

PREPARES RUSTED METAL FOR PAINTING...

Brush or spray OSPHO directly on rusted metal. Let dry overnight.
Test the hard surface that results — the perfect base for paint.

Send for FREE Test Sample

Eliminate sand-blasting or flame-cleaning. Simply brush off loose rust and apply OSPHO on the rusted metal surface. One application *kills* the rust and provides a *sound* base for your regular maintenance paint. Rust action is stopped — paint jobs last much longer.

OSPHO is *not* a primer — *not* a paint. It is a carefully balanced phosphate chromate metal treatment which chemically changes rust (iron oxide) into iron phosphate — an inert, hard, gray surface ideal for painting.

OSPHO provides excellent coverage . . . a gallon treats up to 600 square feet. And cost is low. Available in 1-gallon containers (in cases of 4), 5-gallon pails, 50-gallon barrels. Colorless, non-toxic, non-flammable. Available through distributors.

Repeat orders over the past 16 years are proof of OSPHO's effectiveness. *See for yourself . . .*

Write Now For FREE Test Sample
(on company letterhead)
and descriptive literature

TREATS NEW METAL TOO!
When applied on new ferrous metal, galvanized iron and aluminum, OSPHO imparts a slight etch to the metal, insuring tight bond of the paint coat that follows.

ONLY OSPHO KILLS THE RUST

RUSTICIDE PRODUCTS COMPANY
3125 Perkins Avenue • Cleveland 14, Ohio

QUALITY MAINTENANCE PRODUCTS SINCE 1917

For more facts circle 600 on Reply Card

Cable-Laid Slings have the Flexibility of Manila Rope, the Strength of Steel!

• Cable-Laid Slings are the most versatile wire rope slings ever made! Flexible...strong...resistant to kinking...free from crankiness—they offer a unique combination of advantages that make them the solid favorites for any lifting application where ease of handling is all-important. Many users report Cable-Laid Slings cut rigging time in half, while others say they outlast standard slings 3 to 1!

The secret of Cable-Laid Slings is in the construction of the wire rope—a combination of six individual wire ropes, not strands, laid around a special steel center. Result: Cable-Laid Slings won't kink—even when used on heavy loads with square corners.

Galacco coating keeps Cable-Laid Slings clean and bright, gives them maximum resistance to corrosion. Patented DUALOC endings double-lock sling ends for double security.

And, of course, Cable-Laid Slings are *Registered* Slings. This means that each sling is proof-tested at twice the load-carrying capacity for which it is rated. Then, and only then, does it receive the ACCO tag and certificate of registration.

Get the details on Cable-Laid from your nearby distributor—or write us at Wilkes-Barre, Pa., for **Folder DH-532** giving strengths and weights on a full range of Cable-Laid Slings.

ACCO Registered
WIRE ROPE SLINGS

Wire Rope Sling Dept. · American Chain & Cable Company, Inc.
Atlanta, Chicago, Denver, Houston, Los Angeles, New York, Odessa, Tex., Philadelphia, Pittsburgh, Portland, Ore., San Francisco, Bridgeport, Conn.
In Canada: Dominion Chain Company, Ltd., Niagara Falls, Ontario

ACCO

For more facts circle 601 on Reply Card

NEW PRODUCTS

(Begins on page 168)

closes a sealed Neoprene actuator connected to control air. As air pressure is increased, the actuators inflate and expand the vanes, constricting the open area between them and throttling air flow. When the expanding vanes make contact, shutoff is achieved. For dual duct applications, two Pneumafoil Valves are mounted in a mixing box. The valves come in 16 sizes from 10 by 6 in. to 32 by 24 in., air capacities 1500 to 9600-cfm. Manufacturer says that large and small valves work equally well. Connor Engineering Corp.

37—SLUDGE SCAVENGER
services machine tools

The self-propelled Sludge Hustler is designed to reduce machine tool servicing costs by providing fast scavenging of sludge mixed with chips, metal solids, waste oil and water. It collects sludge by vacuum, transports it to

disposal area and discharges under pressure. It can also service grease traps, drip pans, sumps and settling tanks. Described as highly maneuverable, the Sludge Hustler has a maximum speed of 15 mph, body turning radius of 80 in. Its engine-driven vacuum generator develops a suction of 32 ft of water, enough to handle heavy semi-fluid sludge. Collection rate is about 60 gpm. The unit has a 150-gal tank, carries 25 ft of Neoprene hose, used for both collection and discharge, and is designed to handle a 3000 lb gross load. Gorske Industrial Equipment.

38—NON-RETURN VALVE
tests without dismantling

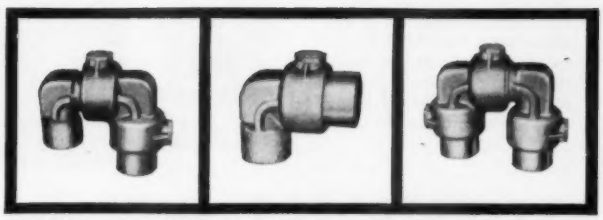
Designed to close when boiler pressure decreases below header pressure, or to automatically cut in the boiler when its pressure equals header pressure, this cushioned single-acting non-return valve offers as a special feature the ability to be tested without dismantling. To determine if work-

PROBLEM: TORSION FATIGUE ON RUBBER HOSE

SOLUTION: CHIKSAN SWIVEL JOINTS

When twisting and kinking on hose lines present a torsion fatigue problem, look to Chiksan for a ready solution. Chiksan Swivel Joints, with free turning 360° rotation allow hose lines to be flexed without the twist caused by fixed position fittings. With Chiksan Swivel Joints hose lines last longer, maintenance and downtime are virtually eliminated.

Call on Chiksan, depend on Chiksan. Over 1000 different types, styles and sizes have been developed for pressures from 28" vacuum to 15,000 psi and temperatures of −70° to +225°F. A nearby representative is ready to analyze your requirements and make specific recommendations. Write today for his name.



Typical Chiksan Swivel Joints

WRITE FOR DESCRIPTIVE CATALOG

CHIKSAN

A SUBSIDIARY OF FOOD MACHINERY AND CHEMICAL CORPORATION fmc

CHIKSAN COMPANY–BREA, CALIFORNIA • CHICAGO 5, ILLINOIS • NEWARK 2, NEW JERSEY

Well Equipment Mfg. Corp. (Division), Houston 1, Texas • Subsidiaries: Chiksan Export Company • Chiksan of Canada, Ltd.

For more facts circle 602 on Reply Card

CONTROL AIR POLLUTION

Profit from public demand for cleaner air

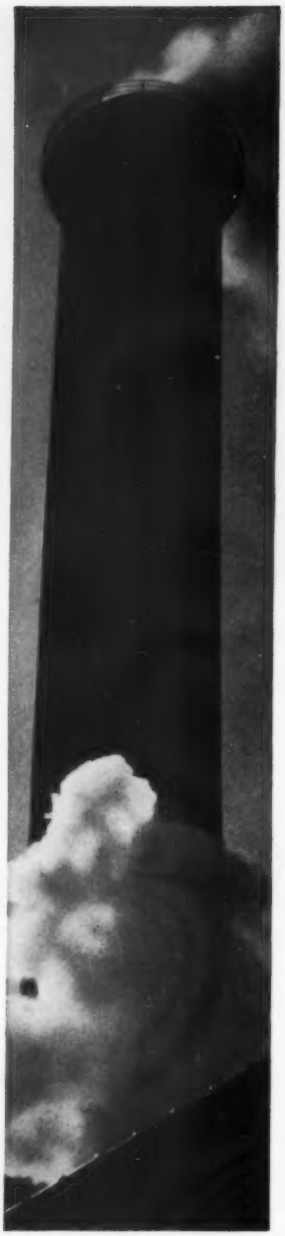
FREE brochure tells you how!

Now learn how you can clean up combustible pollutants, fumes, and odors from your processes. An Oxycat System can be engineered to your special requirements.

Catalytic oxidation installations often lead to actual fuel savings. For many applications they are more economical than flame incinerators . . . more efficient than water scrubbers.

Oxycat Systems are the most effective air pollution control and waste heat recovery method ever developed. Discover how profitably they can work for you in drying ovens, furnaces, and chemical and food processes.

An economical Oxycat System can be your answer to rising public, editorial and medical demands for cleaner air and anti-pollution legislative controls on industry! Improved community relations pay off. Investigate—send today for brochure with facts and figures on typical installations!



STOP DEADLY EXHAUST FUMES

Oxy-Catalyst also manufactures an economical exhaust purifier to stop engine fumes from all type fuels. For use on fork trucks, stationary engines, power sweepers, all automotive equipment used in confined areas! Send for free brochure with full facts.

OXY-CATALYST, INC. Wayne 3, Pa., U.S.A.

OXYCAT

Catalysts for fume and odor elimination, air pollution control, and waste heat recovery

Please send me your free brochure(s) on:

☐ Oxycat Systems to control air pollution, recover waste heat

☐ Oxy-Catalyst Exhaust Purifiers to stop deadly engine fumes

Name_____

Address_____

Firm_____

City_____ Zone_____ State_____

For more facts circle 603 on Reply Card

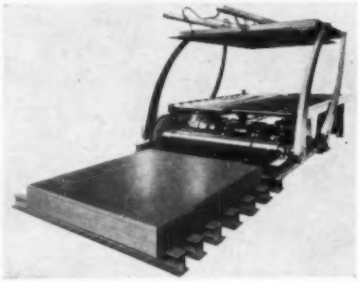
NEW PRODUCTS

(Begins on page 168)

ing parts are moving freely it is only necessary to open a valve on a test line, it is noted; this relieves pressure on main valve and causes it to close. Increased pressure on boiler gage indicates satisfactory operation. The valve is designed so that no automatic moving part contacts a corrosive during operation. It comes in elbow, globe, and angle body styles, in three yoke styles. Bulletin S-2-B gives details on this valve. Golden-Anderson Valve Specialty Co.

39—AUTOMATIC FEEDER handles sheets or plates

This device is designed to pick up sheets or plates from a stack, automatically, one at a time; it places the sheet on a table of driven rolls, aligns it with dies, and feeds it into the press. Operation can be continuous at a fixed cycle, or intermittent. With

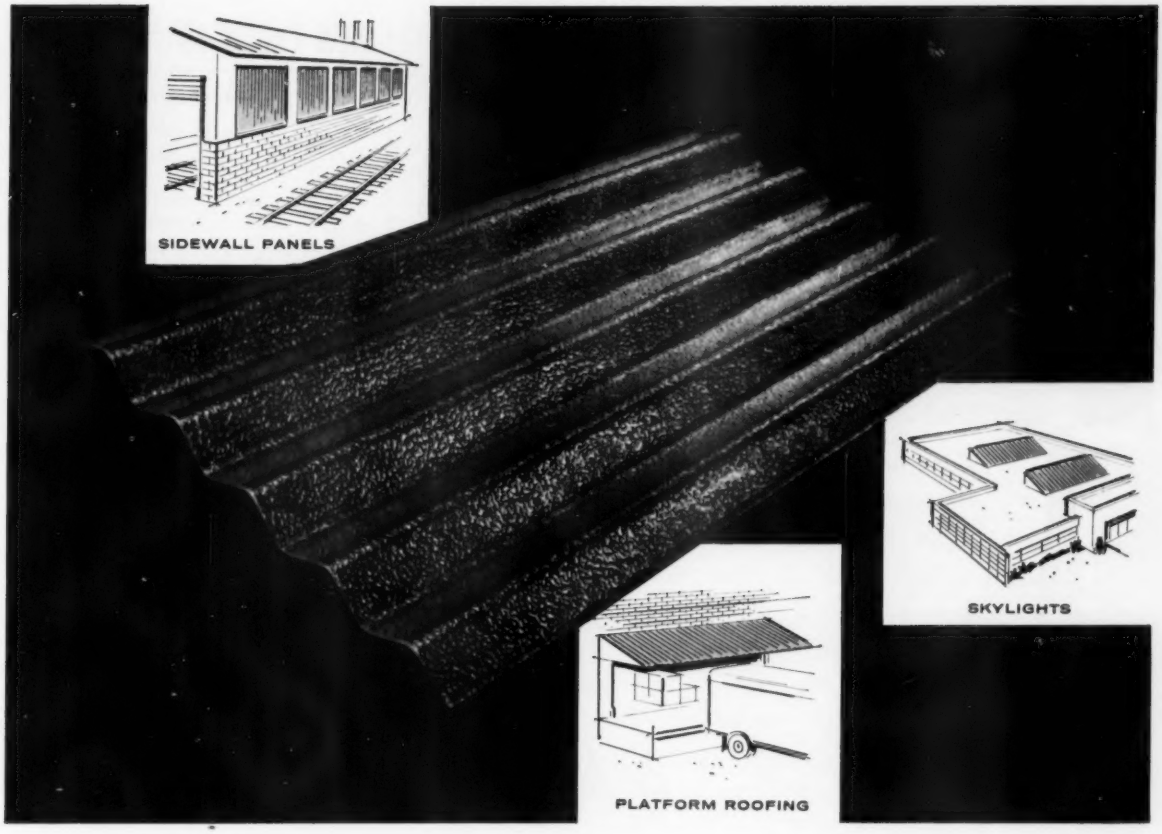


it, one man can do the entire job, it is noted. The equipment consists of a table of I-beams, provided with adjustable side guides to help crane operators locate the stack of sheets in alignment with the machine. Four pivoting arms support a vacuum lifting mechanism. The latter picks up a sheet, carries it horizontally to a position over the feed table. When the vacuum is released, the sheet drops down on the table is aligned, and advanced into the press. After releasing the sheet, the pivoting arms swing back to pick up the next one.

The machine handles sheets or plates from 3½ to 8 ft wide. 7½ to 12 ft. long, weighing up to about 600 lb each, on a 1-min cycle. It requires about 10½-by-28 ft of floor space, 10 ft of head room. It can also be a stacker. Herr Equipment Corp.

40—FREQUENCY RECORDER is narrow-range device

For industrial and other applications demanding close frequency checks, this instrument is announced as fea-

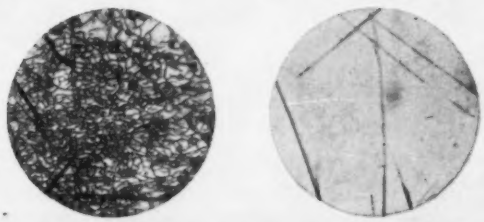


What makes this panel resist weathering?

Other glass-fiber reinforced panels may look like this when new . . . but how about three years later? The answer is in the photomicrographs below. After 36 months of continuous outdoor exposure in Florida, the panel made with acrylic-modified PARAPLEX P-444 polyester resin shows virtually no discoloration or fiber evidence. However, the panel made with conventional light-stabilized resin shows pronounced degradation.

Take advantage of the colorful and attractive appearance, high strength, good light transmission and easy installation of reinforced plastic panels in many locations around your plant. And when you do...insist on the weather-resistance of panels made with PARAPLEX P-444. Write for names of panel manufacturers.

36-MONTH FLORIDA EXPOSURE TEST



Conventional light-stabilized resin — PARAPLEX P-444

Chemicals for Industry

ROHM & HAAS COMPANY

WASHINGTON SQUARE, PHILADELPHIA 5, PA.

Representatives in principal foreign countries

PARAPLEX *is a trademark, Reg. U.S. Pat. Off. and in principal foreign countries.*

PARAPLEX P-444

For more facts circle 604 on Reply Card

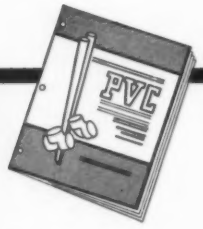
THE CORROSION-FREE WAY
for industrial piping

MUELLER BRASS CO. PVC (POLYVINYL CHLORIDE)

RIGID PLASTIC PIPE AND FITTINGS

Corrosion problems in your piping system can be permanently solved with an installation of Mueller Brass Co. PVC plastic pipe and fittings. PVC resists corrosive actions of water, oil, alkaline or salt solutions, gases and a wide variety of acids. The mirror-smooth interior bore prevents deposit build-up and insures continuous maximum flow capacity. Mueller Brass Co. PVC is economical, light-weight, can be easily joined by threading or solvent cement, thus saving on installation time and expense. The permanent built-in finish of PVC reduces maintenance by eliminating the need for costly painting or protective coating. Mueller Brass Co. PVC is tough and durable . . . withstands shock, impact and vibration and can be used at higher pressures than other similar materials.

For a corrosion-free, efficient industrial piping system at low cost, specify Mueller Brass Co. PVC rigid plastic pipe and fittings.



NORMAL IMPACT PVC—good impact strength . . . maximum chemical resistance.

HIGH IMPACT PVC — maximum impact strength . . . high chemical resistance.

Pipe is fabricated in 20' lengths; ½" through 3" sizes—I.P.S. schedules 40 and 80. Fittings are available in ½" through 3" sizes; threaded and socket-type for schedule 80 and in socket-type only for schedule 40.

Write for the new Mueller Brass Co. Technical Brochure.

MUELLER BRASS CO.
PORT HURON 52, MICHIGAN

274

POLYETHYLENE PIPE AND PLASTIC FITTINGS, COPPER TUBE, VALVES AND FITTINGS

For more facts circle 605 on Reply Card

NEW PRODUCTS

(Begins on page 168)

turing a 58 to 62 cycle range, accuracy of ±0.05 cycles, and self-contained construction. According to manufacturer, expanding the instrument's scale—calibrating a standard 6-in. record roll for only four cycles rather than 10—achieves higher recording accuracy and greater chart reliability. Available for compact semi-flush or surface panel mounting or as a portable instrument, this recorder uses no external impedor. Elimination of this component and associated mounting and wiring lowers installation time and costs, it is noted; similarly, hook-up time is reduced when using the portable version. The recorder incorporates throw-away inkwell, 150-ft record roll, multiple chart speeds. It is also available for 50- or 25-cycle use. General Electric Co.

More information on any of these products can be yours without cost or obligation. Just circle the item numbers on the Reader Service Cards provided on pages 235-236.

41—D-C MOTORS offer a wider speed range

Flexitorq Motors are announced as providing a faster response, wider speed range and higher overload capacity in a lighter, more compact machine. They come in 1- to 200-hp ratings, in drip-proof and drip-proof guarded enclosures. These d-c motors are designed to supply constant or

adjustable speed for driving machine tools, metal working equipment, cranes, hoists, conveyors.

Faster acceleration, deceleration, reversing and speed changing are reported possible because of a low inertia armature and improved commutating ability. A new Class B insulation is used to permit intermittent high overloads without damage to the insulation system, also a factor in the motor's reduced weight and size. Due to controlled ventilation and

For more facts circle 606 on Reply Card →

6 Ljungstroms® go to work for the city of Memphis ...and so does lifetime Air Preheater service

The City of Memphis Light, Gas and Water Division has just installed three boilers served by six Ljungstrom preheaters. Why Ljungstrom preheaters? One reason is service. Air Preheater engineers don't just wait for a call. They regularly inspect and help maintain Ljungstroms *through the life of each unit.*

What's more, Air Preheater provides rapid *factory* service in an emergency. Here's an example. A customer phoned on a Friday morning for a replacement trunnion—a major integral part of the preheaters. His Ljungstrom was 17 years old, which meant that a new trunnion had to be custom made to match his older-style. He was located 500 miles away. And he needed his boiler back on the line by Sunday.

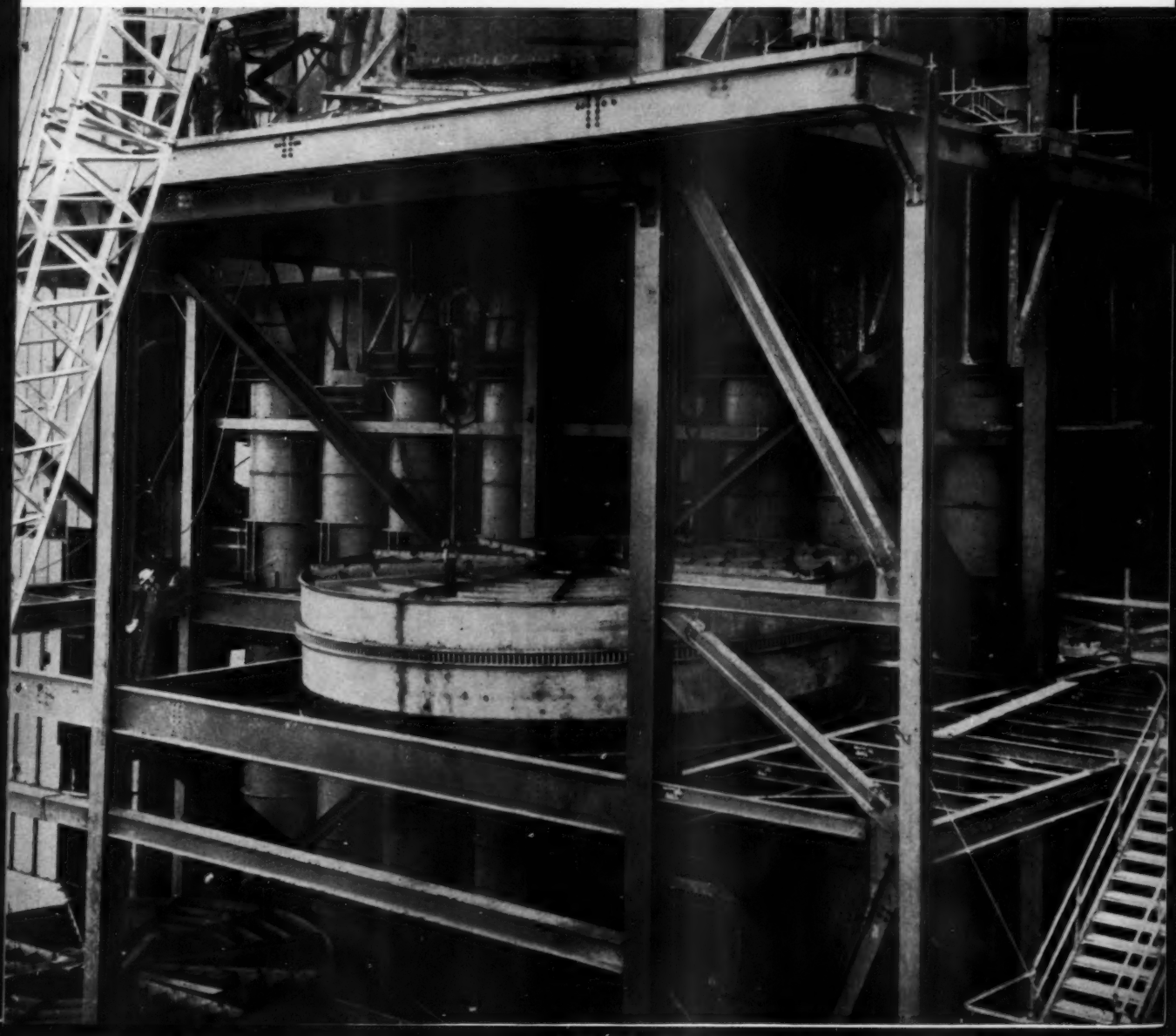
Air Preheater went to work. Special trucking was arranged. The job was done *and shipped* that same evening. The customer had the trunnion by Saturday morning and the boiler was back on the line by Saturday evening!

Fast response to emergencies and regular inspection of Ljungstrom installations are two of the many advantages Air Preheater provides its customers. Another is expert knowledge of boiler and preheater problems —and how to lick them—gained from over 35 years of experience. Perhaps these reasons explain why 9 out of 10 preheaters sold today are Ljungstroms. For further information write today for free illustrated brochure.

THE AIR PREHEATER CORPORATION

60 East 42nd Street, New York 17, N. Y.

Ljungstrom rotor being installed for the City of Memphis Light, Gas and Water Division. Six such Ljungstroms—each with 201,400 sq ft of heating surface—will serve three boilers. The boilers will each evaporate 2,000,000 lbs of steam/hr and have a combined nameplate capacity of 750,000 kw. A fourth boiler unit is now under consideration. Burns and Roe, inc. designed and supervised construction.



NEW dry-acid cleaners are concentrated, easier to handle, require less storage space. One 100-lb. drum, for example, occupies only 1.9 cubic ft. of storage space – is more than equivalent to a 192-lb. carboy of 18° Be' HCl.

OLD cleaning method required stocking bulky, returnable carboys of liquid acids. Special precautions are necessary in shipping and handling. And a 192-lb. carboy of 18° Be'hydrochloric acid occupies 5.6 cubic ft. of valuable storage space.

✓ Lower storage cost

Just one of the reasons why **Dry Acid Cleaners** based on **Du Pont Sulfamic Acid** are gaining wide favor for industrial equipment cleaning: ✓ Safer to handle ✓ Easy to use ✓ No hazardous fumes ✓ Powerful descaling action ✓ Less corrosive ✓ Lower handling and shipping costs.

CLEANERS BASED ON SULFAMIC ACID REMOVE SCALE AND DEPOSITS FROM:
Steam Boilers, Condensers, Heat Exchangers, Piping.

DU PONT **Sulfamic Acid**

BETTER THINGS FOR BETTER LIVING...*THROUGH CHEMISTRY*

Please send me:

☐ Free booklet about dry-acid cleaners based on Du Pont Sulfamic Acid

☐ Names of formulators who offer these cleaning compounds

E. I. du Pont de Nemours & Co. (Inc.)
Grasselli Chemicals Dept., Rm. N-2543PE
Wilmington 98, Delaware

Name_____

Firm_____ Title_____

Address_____

City_____ State_____

For more facts circle 607 on Reply Card

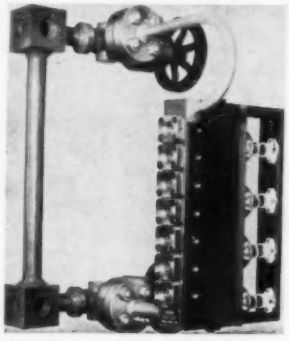
NEW PRODUCTS

(Begins on page 168)

greater protection of ventilation openings, the Flexitorq in drip-proof construction is claimed suited for many locations where a drip-proof motor was previously impractical. Bulletin 3150 gives data. The Louis Allis Co.

42—LEVEL GAGE for the medium pressure boilers

Although similar to manufacturer's high pressure model, this Yarway Color-Port Water Level Gage is designed specifically for boilers operating at pressures to 1050 lb WSP. Design is individual port type, with

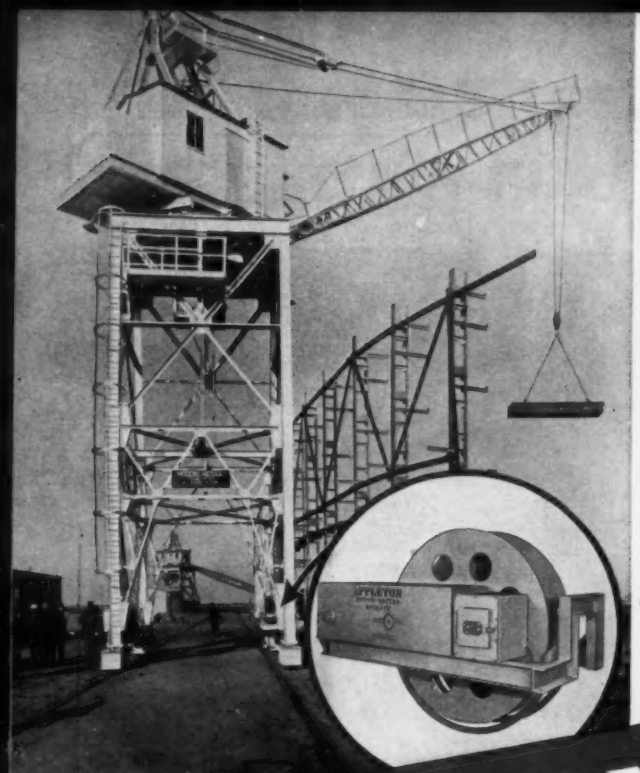


cover plate assemblies that can be readily serviced or replaced with the gage in place. Spring loading maintains proper pressure on the sealing gasket, company states, and port assemblies are interchangeable. The Color-Port gives brilliant two-color readings—steam showing red, water showing green. A full gage is all green, and empty one, all red. Ranges of visibility available are 13, 15½ and 18 in. Bulletin WG-1815 gives details. Yarnall-Waring Co.

43—LEAD PUTTY works without heat, pressure

Devcon L is announced as a putty-like material, 94 per cent lead and 6 per cent plastic, which can be formed into any shape without heat or pressure. According to company, it becomes a tough, durable mass similar to lead itself 2 hr after addition of a hardening agent; once hardened, it can be drilled, sawed, or otherwise machined. Devcon L is said to have high impact, compression and tensile strengths, and to resist most solvents and chemicals. Manufacturer says it bonds lead, steel, aluminum, bronze, brass, wood, iron, porcelain and other materials to themselves or each other. Uses in-

For more facts circle 608 on Reply Card →

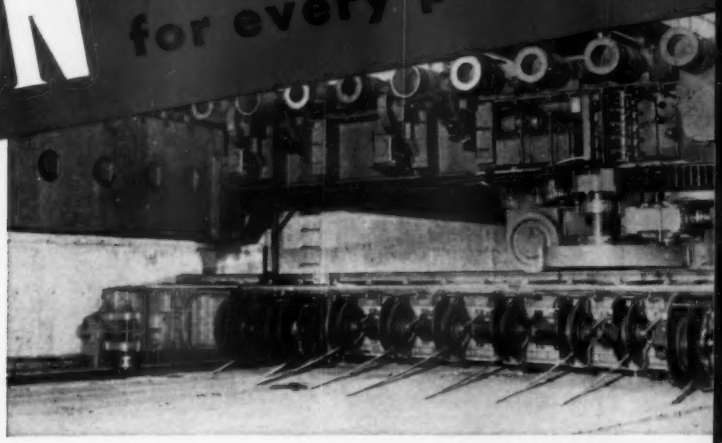


Whether it's for the largest crane or smallest hand lamp, there's an APPLETON *Reelite* to pay out and retract cable with unfailing precision, safety, ease of handling. Made of finest quality materials and to APPLETON-engineered standards of perfection, they are the best you can buy for the purpose. Next time you need a retractable cable mechanism, investigate APPLETON *Reelites*... the finest!

Custom designed model Reelites can be developed to fulfill your requirements. As many as 36 conductors can be built into a single compact Reelite. Explosion-proof, weather-proof, vapor-proof . . . air, fluid, torque and tool-balance Reelites are all part of the vast variety of APPLETON reel models. Many Reelites come equipped with clutch or limit switch arrangements built within the unit.

Gantry Crane with special (motor driven) constant duty *Reelite* paying out 500 ft. of 4/0 3-conductor 600 volt Type "W" cable

APPLETON® REELITES* for every purpose



Installation using a custom built Type "EG" constant duty automatic take-up *Reelite* for unloading steel from gondola cars

Battery of 9 various *Reelites* mounted on moveable machine providing a wide variety of individual power leads to this large stamping operation for power and control

Full Information On Request . . . No Obligation

"YS" *Reelite* mounted to pay out cable for roving overhead electric hoist. 335° swivel. Provides maximum flexibility without dangers of snagging, plus elimination of electrical hazards

**Only APPLETON Makes Reelites*

APPLETON ELECTRIC COMPANY
1701 Wellington, Chicago 13, Ill.

Also Manufacturers of:

APPLETON ELECTRIC - PRODUCTS®

Try these 3 tests with Pittsburgh

Dust Control is a job for Engineers

The "rule of thumb" methods of the inexperienced, or the "engineering rules" of an experienced design, fabrication, and installation firm—which will you select for your dust control problems?

Kirk and Blum offers you...

ENGINEERING—a staff of qualified engineers with proven ability to solve your dust control problems.

RESEARCH—continuous research on full scale equipment, to develop the most efficient systems.

EXPERIENCE—over 50 years of dust control service.

Every Kirk & Blum installation is based on a complete service: Design — Fabrication — Installation, backed by K & B's acceptance of One Undivided Responsibility for the system to assure your satisfaction.

On your dust control problem consult Kirk and Blum, craftsmen in dust control, where fine craftsmanship is appreciated. The Kirk & Blum Manufacturing Company, 3189 Forrer St., Cincinnati 9, Ohio.

KIRK & BLUM DUST CONTROL SYSTEMS

For more facts circle 609 on Reply Card

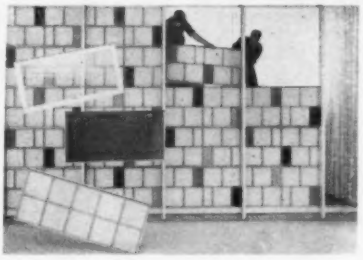
NEW PRODUCTS

(Begins on page 168)

clude repairing lead tanks, splicing and repairing lead cables, other maintenance work. Because it contains no volatile solvents, Devcon L is non-shrinking and non-flammable, it is pointed out, and because it can be shaped to exact forms, it has application in making shields against radioactive materials. Devcon Corp.

44—CURTAIN WALLS have a fresh, new look

Addition of rectangular, prismatic glass shapes and ceramic fired-on colors to the Thinlite Curtain Wall System, afford broader design flexibility and advantage of daylight control. Use of the new horizontal and

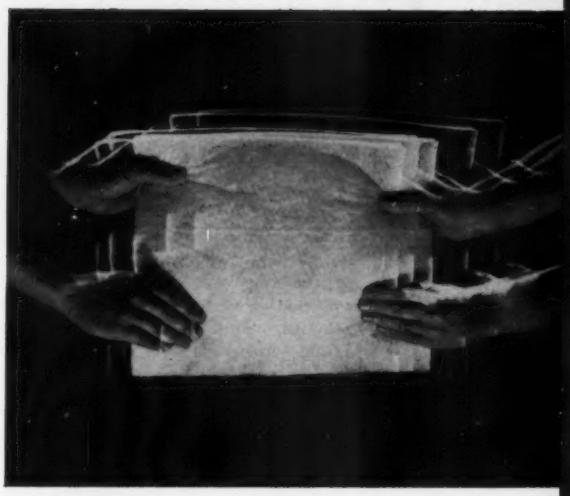


rectangular shapes, plus the square shape give the opportunity to create mosaic patterns with any of 11 colors. The modular 4-by-2 in. and 5-by-2 in. panels are 2 in. thick, provide both an inside and outside finished wall, and have extruded aluminum, interlocking perimeters. They are secured to struts by a bolt-assembly fastened by screwdriver. Kimble Glass Co., Owens-Illinois.

45—PRIMER COATING gives easily applied protection

This protective coating is based on the reaction of a blocked isocyanate and an amine-bearing resin in an aqueous solution. Among advantages claimed for the one-component system are: a higher order of chemical resistance; excellent adhesion to metals; flexibility; ease of formulation; and application; non-toxic properties; non-inflammability; and reduced cost. In formulation, the blocked isocyanate is used in a concentrate of polyamide resin and an emulsifier. Water is added and the composition blended by agitation. Colors are achieved by adding pigment to the concentrate or emulsion during agitation. Curing of the water-based coating is done at normal bake temperatures. The system may also

Try these 3 tests with Pittsburgh Superfine Fiber Glass Insulation



PULL IT—see how strong Pittsburgh Superfine is! It's built to last wherever you install it. It retains this same strength indefinitely. Won't disintegrate or rot with age.

PRESS IT—and see how it returns to its original shape. You can compress Pittsburgh Superfine for long periods of time, yet it will always spring back to its former shape!

GIVE IT A BEATING—and see how Pittsburgh Superfine absorbs the shock, and comes back. Pittsburgh Superfine loves rough handling.

PITTSBURGH SUPERFINE FIBER GLASS is great for insulating against heat or cold or noise. It's lightweight, cuts easily to correct size . . . is rot-proof, fire-resistant . . . handles easily, avoids skin irritation . . . saves installation time. Try it!

For complete information on Pittsburgh Superfine, call your nearest PPG Sales Office, or write to *Pittsburgh Plate Glass Company, Fiber Glass Division, One Gateway Center, Pittsburgh 22, Penna.*

PITTSBURGH SUPERFINE INSULATION IS A PRODUCT OF THE FIBER GLASS DIVISION OF PITTSBURGH PLATE GLASS COMPANY

Sales Offices are located in the following cities: Charlotte, Chicago, Cincinnati, Cleveland, Detroit, Houston, Los Angeles, Minneapolis, New York, Philadelphia, Pittsburgh and St Louis

FIBER PG GLASS PITTSBURGH PLATE GLASS COMPANY

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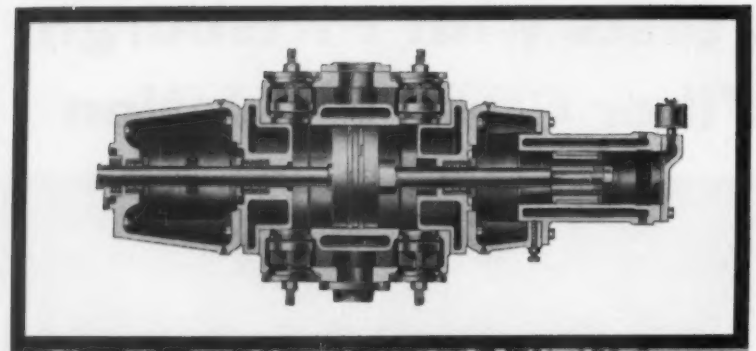
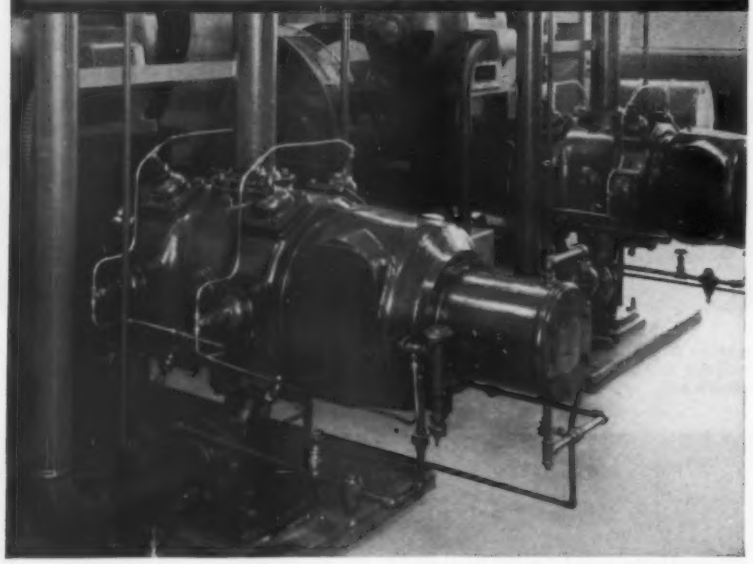




with PENNSYLVANIA tailrod construction,

COMPRESSORS PROVIDE GUARANTEED OIL-FREE AIR...eliminate contamination

If your processes stand the chance of being ruined by the least contamination, better look into Pennsylvania Oilfre Compressors today. They are built specifically to eliminate any lubricant or oily vapor which would interfere with delicate instruments, contaminate food and beverages or be incompatible with chemical processes.

*Pennsylvania Oilfre construction is one reason that we can guarantee oil-free compressed air or gas. An extra long distance piece between compressing cylinder and main frame assures that no part of the piston rod which enters the lubricated frame will alternately enter cylinder stuffing box. Result: a compressor with isolated cylinder which will deliver air or gas guaranteed entirely free of oil or oily vapors due to lubricants. Pennsylvania tailrod construction produces a full floating piston which prolongs the life of carbon piston rings and eliminates the danger of piston riding against cylinder walls.

Get full details on Pennsylvania 3-ATC Compressors. Send for free copy of Bulletin 351, today.

PENNSYLVANIA PUMP AND COMPRESSOR CO.

Easton, Pa. • Earning customer confidence since 1920

For more facts circle 611 on Reply Card

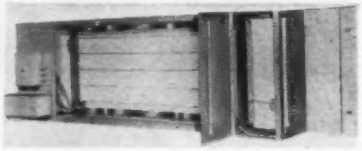
NEW PRODUCTS

(Begins on page 168)

be formulated by using low-cost solvents rather than water; however, use of water as the primary solvent minimizes the raw material cost. Finish cost is expected to be competitive with other lower-cost corrosion-resistant systems. Mobay Chemical Co.

46—AIR FILTER now comes in horizontal design

Operation of the Type H Roll-O-Matic is automatic, and features announced for it included minimum maintenance and constant filter resistance. Its operating principle is that of company's regular Roll-O-Matic—in which the renewable media (a woven curtain of glass fibers)



traverses the face of the filter and rolls up collected air contaminants, with used media, into a disposable roll at the side. The horizontal design is suggested for application on new or existing multi-zone air conditioning units, heating and ventilating units, industrial heaters. It answers the need for horizontally designed filters in ventilating systems where headroom is limited. The Type H Roll-O-Matic can be arranged two units high, where additional capacity is required, with only one drive and timer assembly. Ten sizes cover capacities from 4070 to 39,000 cfm. Bulletin 247 gives details. American Air Filter Co.

47—REPAIR KIT holds handy plastic components

Liquid and paste plastic compounds in the Old Pro Kit solidify to adhere and lend strength to fractures, tears, holes or dents in metal, wood, plastic, concrete, ceramic and other materials. Tests are reported to indicate that many repairs formerly requiring welding, brazing, riveting or soldering can be done more quickly with this kit and without use of a torch. The kit contains 1 qt each of Flex-Bond, a paste-type plastic resin; WetWeld, a liquid plastic resin; fiber glass cloth; mixing tools and brushes. With the addition of hardener, Flex-Bond cures quickly to a strong, tough mass that is adhesive, yet relatively flexible. WetWeld also cures to solid-

LOOK *for improvements in industrial handcleaners*

A NEW WAY to clean working hands

There has never been such a combination of *plus* features to keep workers' hands healthy—and therefore on the job day after day!

It's a brand new scientific formulation — non-depleting Lan-O-Kleen *PLUS*.

It's WEST'S famous Lan-O-Kleen handcleaner . . . *plus* a softer scrubbing action . . . *plus* a gentler sudsing action . . . *plus* a soothing lanolin action!

All of which combine to combat the depletion of natural skin oils while hands are being washed clean.

Highly important is the exclusive process that keeps the rich lanolin content of Lan-O-Kleen *PLUS* "free" to soothe and soften. Lanolin is impregnated into a corn meal base, instead of being "held" in the soap by conventional methods. In this way, it is instantly released for more positive, beneficial action.

Lan-O-Kleen *PLUS* is dispensed from a patented, precision-action unit. A clog-proof measuring valve with a mechanical agitator delivers a thrifty, yet adequate individual portion. More than 435 pairs of hands can be washed with each dispenser filling.

FREE TRIAL OFFER. We'd be glad to send five pounds of Lan-O-Kleen *PLUS* and loan a dispenser for free trial. Or we'll send a smaller sample for evaluation. Just call your local WEST office. Or mail the coupon to our Long Island City Headquarters, Dept. 13.

☐ Supply a dispenser and 5 lbs. of Lan-O-Kleen *PLUS*.
☐ Send a small sample of Lan-O-Kleen *PLUS*.

Name_____

Position_____

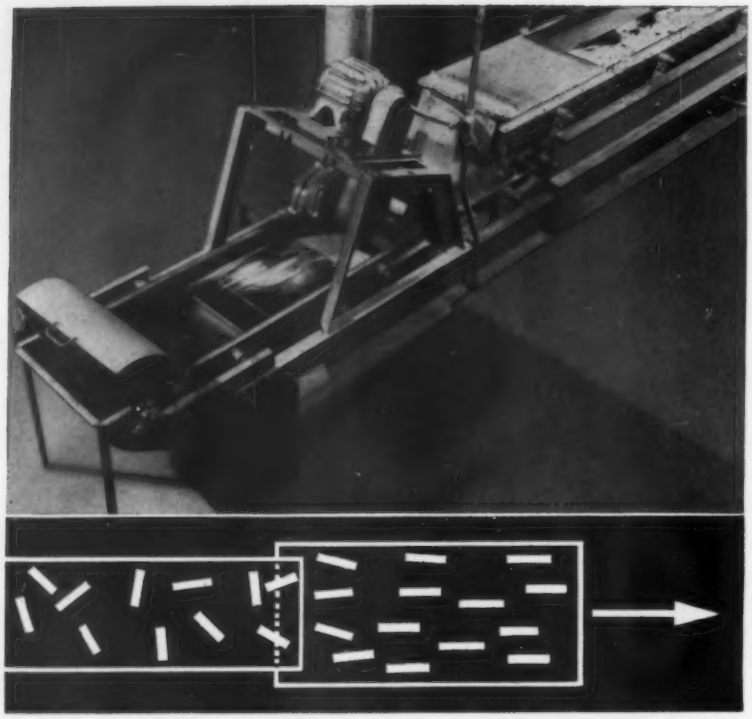
PROGRAMS AND SPECIALTIES
FOR PROTECTIVE SANITATION
AND PREVENTIVE MAINTENANCE

WEST CHEMICAL PRODUCTS INC.

WEST DISINFECTING DIVISION

WEST CHEMICAL PRODUCTS INC.
42-16 West Street, Long Island City 1, New York
Branches in principal cities
CANADA: 5621-23 Casgrain Avenue, Montreal

For more facts circle 612 on Reply Card



AJAX VIBRATION ENGINEERING designs to your conditions. Sketch shows how machine sorts and aligns random-spaced materials for further processing. Facilities are maintained at AJAX for testing characteristics of your materials to suit individual requirements.

ANNOUNCING AJAX
Vibration Engineering Service

To help You Shake Down Your Costs of...

Handling, processing and conveying bulk, semi, and finished materials from foundry sand to food products and from talcum to gun powder. AJAX VIBRATION ENGINEERING offers a wealth of experience in putting vibration to work for the Who's Who of industry. You don't have to be BIG to cut your costs and improve your competitive position by taking advantage of its savings.

AJAX LO-VEYORS **Separate, Sort, Align, Process, Wash, Cool Dry, Clean, and Salvage as they Convey**

Learn how AJAX VIBRATION ENGINEERING makes it possible for one multi-purpose Lo-Veyor to perform several operations at the cost of a single machine. Phone or Write outlining your requirements and ask for this New Ajax Selection Guide which shows how vibration will shake down your costs.

AJAX

AJAX FLEXIBLE COUPLING CO. INC.
100 Portage Road, Westfield, N. Y.
Please send Ajax Lo-Veyor Selection Guide to

Name_____

Concern_____

Address_____

For more facts circle 613 on Reply Card

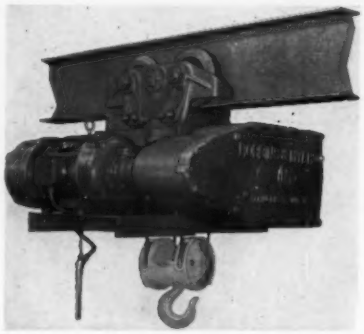
NEW PRODUCTS

(Begins on page 168)

ity with hardener furnished. The fiber glass cloth soaked in WetWeld is reported to make strong structural repairs. Both resin materials can be filed, buffed and painted. Taylor and Art, Inc., Plastics.

48—ELECTRIC HOISTS in 1½ to 7½ ton capacities

Extremely low headroom is required by Type F3 Hoists—only 24 in. for the 5-ton model. Motor and control box on the hoists are totally enclosed, it is pointed out, and the addition of a simple diaphragm at the push button station makes the hoists suitable for outdoor use without additional



protection. The hoists are powered by a 7½ hp, 30 min, 55C rise enclosed motor with weatherproof brake —a totally-enclosed, magnetic motor brake of the multiple disc type with short stroke travel to prevent peening. It may be adjusted externally without dismantling. A four-position, weight operated limit switch is provided to protect both hoist and operator. If for any reason the hook block reaches maximum safe height the motor is automatically reversed, lowering the block to a safe position, manufacturer explains. In the event of phase reversal at power source or reversed controls caused by incorrect installation, the limit switch serves to break all electrical circuits within the hoist, stopping hook travel. Robbins & Myers, Inc.

49—VARIABLE SPEED DRILL comes in new capacities

The redesigned R-P-Master variable speed drill offers greater capacities and new torque-controlled power feed in addition to other features. New capacities in mild steel are: No. 1A, 1 in.; No. 2A, 1½ in.; and No. 3A, 2 in. The power feed consists of an

For more facts circle 614 on Reply Card

THESE COLORS

CAN CUT YOUR PRODUCTION COSTS

When you use paints of proven quality—finishes that are tough, durable and right for the job—that's one kind of economy. And reason enough for specifying Du Pont Paints.

But *production* savings are something else again—a bonus you get when you paint according to the Du Pont system of Color Conditioning. It's the scientific application of color to reduce eye fatigue, boost employee morale and efficiency, promote safety, thereby increasing profits.

Du Pont will be glad to show you how you can apply the power of color profitably in your business. The full story is included in a free, illustrated 28-page booklet, "How to Put Color to Work." Write: E. I. du Pont de Nemours & Co. (Inc.), Finishes Division, Dept. PE-95. Wilmington 98, Delaware.

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Better Things for Better Living . . . *through Chemistry*

When production flow depends on a heavy duty hoist . . .
LO-HED® PERFORMANCE COMES BEFORE PRICE.

When you hit the *really* tough aerial handling problems . . . in places where production flow depends upon continuous hoist performance, and hoist down-time means lost production . . . you need the extra margin of heavy duty performance that only an AE LO-HED hoist can give. Or when you bump into tough headroom problems, LO-HED hoists give you extra feet of lifting height . . . lift loads closer to the ceiling—give you maximum use of every cubic foot in the hoisting area.

The AE LO-HED is built for these trouble spots . . . the spots in your plant where conventional heavy duty hoists just aren't "heavy duty" enough . . . the spots where you are hemmed in by fixed ceiling height . . . the spots where performance comes before price.

For complete information and specifications, refer to Sweets Plant Engineering File 1a/Ae, or write for your copy of our new catalog H-59. AMERICAN ENGINEERING COMPANY, Dept. H-164, Philadelphia 37, Penna.

AMERICAN ENGINEERING COMPANY

Hele-Shaw and Hydramite Pumps • Lo-Hed Hoists • Vibra-Grate, Perfect Spread and Taylor Stokers

AE Marine Deck Auxiliaries.

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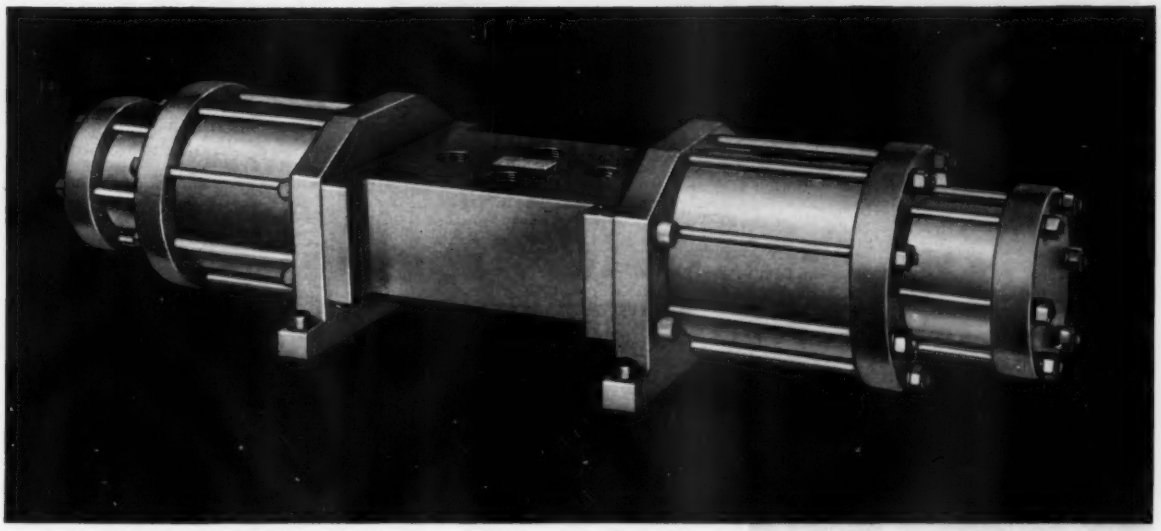
HUNT
HYDRAULIC VALVES

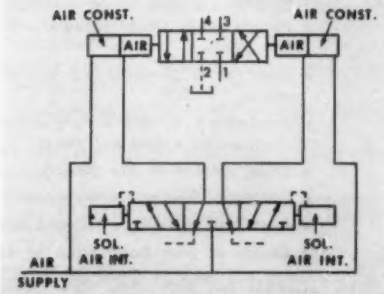
First Choice in the Steel and other Heavy Industries



Here's Why!

Over 20 years of specialized experience designing—and building—hydraulic operating valves for rugged industry requirements . . . ½" to 8" sizes . . . Zero leakage on water, soluble oil and water, or oil . . . Valves to meet any application . . . No metal to metal seating . . . Easy field maintenance . . . Inexpensive maintenance parts . . . For utmost dependability and service call the Hunt man.

1½" Three Position 4-way Air Pilot Operated 2000 p.s.i. Valve for Oil or Water Service. Other Designs to 5000 p.s.i. Control Circuit Diagram Below Shows Automatic Return to Mid Position.



More startling HUNT designs to come!

40 1919 1959 YEARS of Service

HUNT

***Quick-As-Wink*®** AIR AND HYDRAULIC CONTROL **Valves**

Manufactured by HUNT VALVE COMPANY, 2082 East Pershing St., Salem Ohio

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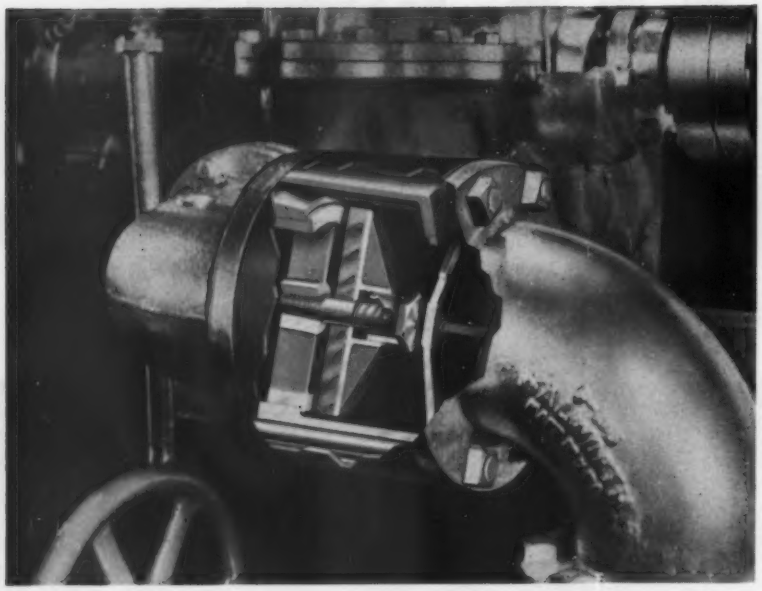


CPV CHECK VALVES ARE SILENT

. . . and this non-slam feature is your *positive* assurance of a silent, safer piping system, with protection to the pump, and other equipment.

Easily installed wherever liquid flows, a CPV Check Valve closes automatically as soon as forward flow stops. The valve is closed before any reverse flow occurs. Dangerous line surges and hammer are eliminated without expensive air cushions, shock absorbers and other devices.

Only CPV CHECK VALVES Give You All These Features

- Straight guided disc with two point bearing assures positive valve seating.
- Helical spring is engineered to close automatically as soon as forward flow stops.
- Ideal for all pressures and temperatures—including high temperature water.
- Available in a wide variety of materials, including Alconite, bronze, steel, stainless steel and monel.
- Easily installed in any position.
- Full radial flow with minimum head loss.
- Approved by Factory Mutual Laboratories for fire lines.
- Choice of four basic types in sizes from ½-in. to 18-in. or more.

Get the full story about CPV Silent, Non-Slam CHECK VALVES. Write today for Catalog C.

STYLE G . . . 2-10"

STYLE GB . . . 6-18"+

STYLE NU . . . ½-2"

STYLE H . . . ½-2"

COMBINATION PUMP VALVE CO.
851 PRESTON STREET • PHILADELPHIA 4, PA.
SOLD BY RELIABLE AGENTS IN PRINCIPAL CITIES

For more facts circle 617 on Reply Card

NEW PRODUCTS

(Begins on page 168)

all-geared positive feed with a torque device on the feed shaft factory set for maximum torque. Overload causes slippage, preventing damage to machine, company says. Offered in one- to six-spindle models, units are available with standard and speacial accessories. Bulletins 3257-C and 3967 give details. Buffalo Forge Co.

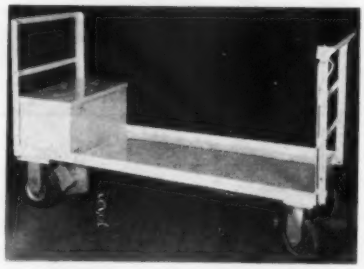
Reader Service Cards on pages 235-236 make it easy to get further information on any of these products. Just circle the item numbers of the products you would like to know more about.

50—LUMBER processed to repel termite invasion

Utilizing techniques developed by Koppers Co., Inc., this lumber company offers Wolmanized Lumber with "built in" rot and termite protection for only pennies extra per board foot. Specifically, chemicals known as Wolman salts are forced under pressure into the fiber of the wood being treated. Aside from its protective value, Wolmanized Lumber is otherwise no different from untreated wood, it is pointed out; the processing leaves no surface oils or residues, and it can be cut, drilled, nailed or painted like any other wood. West Elizabeth Lumber Co.

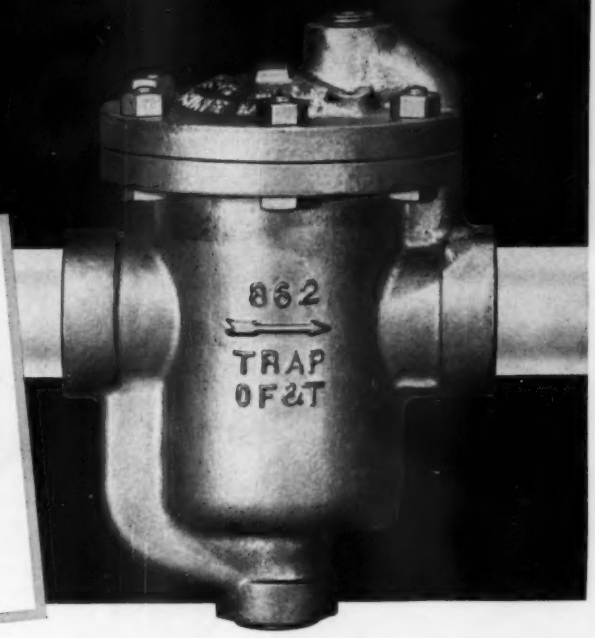
51—WALKIE TRUCKS are electric battery powered

Electromite M2 Walkie Trucks have the power mechanism built onto one of the rigid casters on the vehicle itself. The battery is enclosed in a compact case that can be carried anywhere on the truck or bin. The trucks are designed to permit an operator to transport loads up to 1600 lb and to travel up a 10 per cent grade. Fingertip buttons control forward and reverse and speeds to 5 mph. Trucks



Here are the steam traps designed especially for heating systems . . .

ARMSTRONG OPEN FLOAT AND THERMOSTATIC STEAM TRAPS



Engineered for low pressure intermittent service where large amounts of air accumulate while steam is off

Armstrong O.F.&T. Traps make it possible for heating systems to deliver the efficiency they were designed to deliver. They are ideal for low pressure unit heaters, pipe coils and standing radiation.

Advantages to the user:

BIG AIR HANDLING CAPACITY—Thermic vent handles large amounts of air in system when steam is turned on. Fixed vent handles normal air in system.

NO STEAM LOSS—Stainless steel valve is water sealed, is not damaged by dirt or scale, cannot develop steam leaks.

CONDENSATE AND AIR REMOVED AT STEAM TEMPERATURE—No opening lag.

LONG LIFE—All working parts, including open float, are stainless steel. Bodies and caps designed for 250 psig operation. Open float cannot collapse.

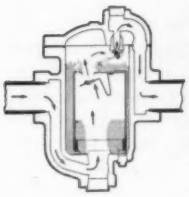
MINIMUM MAINTENANCE—Simple, proved design and high quality materials assure trouble-free service.

LOST COST—Mass production methods permit high quality at low cost.

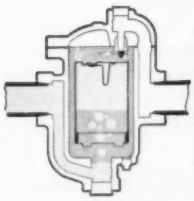
EASY INSTALLATION—Horizontal straight-through pipe connections, conventional sizes.

UNCONDITIONALLY GUARANTEED—All Armstrong Traps are guaranteed to satisfy the user or purchase price will be refunded.

HOW ARMSTRONG O. F. & T. TRAPS WORK:



When steam is turned on, it pushes air through the wide open thermic vent and trap discharge valve at full differential pressure between supply and return lines. Condensate formed by incoming steam goes right through.



As steam reaches open float, thermostatic vent closes. Float fills with steam and rises to close trap valve. Residual air and CO_2 escape through fixed vent at steam temperature.

BULLETIN NO. 775 BULLETIN NO. 801

Use the coupon at right to get these helpful bulletins: No. 775 describes O.F.&T. traps fully. No. 801 tells how to select traps for draining unit heaters including data on 30 makes of unit heaters.

ARMSTRONG MACHINE WORKS
9125 Maple St. • Three Rivers, Mich.

Armstrong Machine Works
9125 Maple St., Three Rivers, Mich.

Please send me: ☐ O.F.&T. Trap Bulletin No. 775; ☐ Unit Heater Bulletin No. 801.

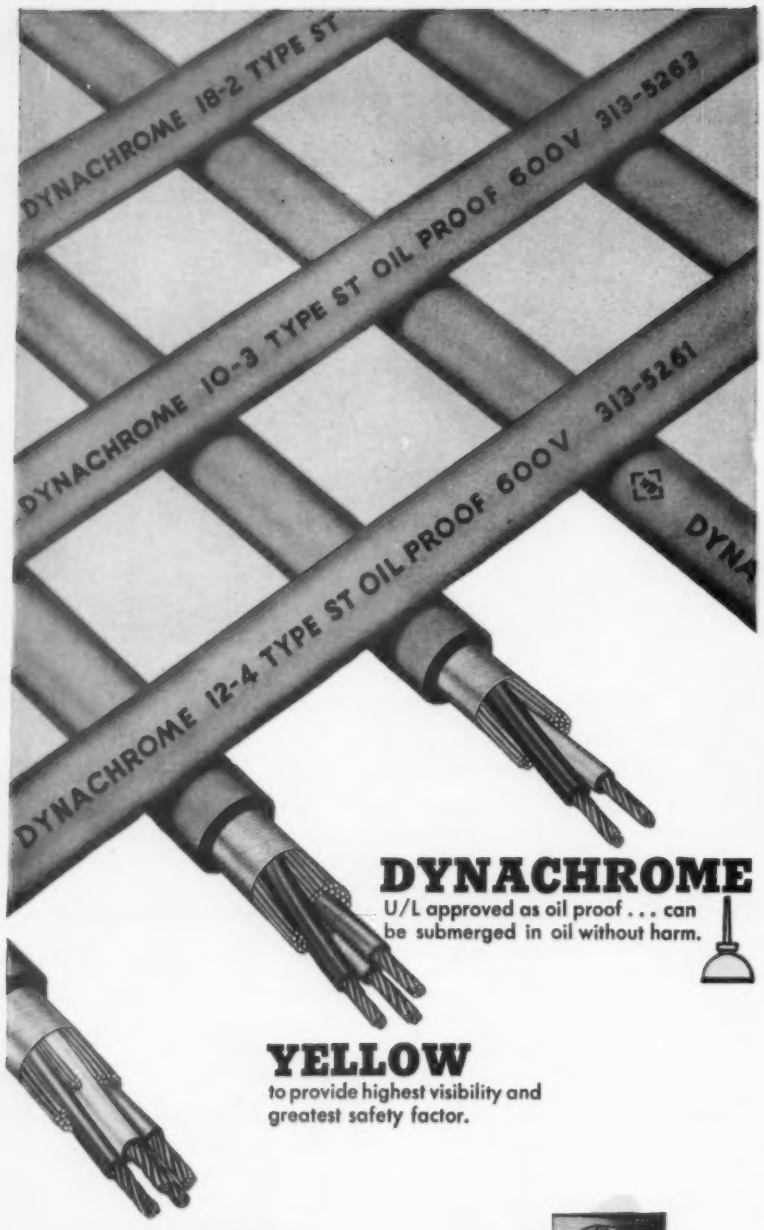
Name.....

Company.....

Address.....

City.....Zone.....State.....

For more facts circle 618 on Reply Card



DYNACHROME
U/L approved as oil proof . . . can be submerged in oil without harm.

YELLOW
to provide highest visibility and greatest safety factor.

MARKED
clearly with type, size and number of conductors, as well as catalog number, all for easy identification.

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WELL BUILT WIRES SINCE 1899

WHITNEY BLAKE CO.
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NEW PRODUCTS

(Begins on page 168)

have dynamic brakes and heavy duty solid rubber tires in 8- and 10-in. sizes. They work on a low voltage battery which is recharged by plugging into light socket. Dynex, Inc.

52—BY-PASS VALVE for softener installation

Designed to simplify and speed the installation and repair of water conditioning equipment, this brass by-pass valve eliminates the array of valves and fittings used in many water softener by-pass installations. Threadless

packer fittings on the valve enable the unit to be used with either ⅜-in. iron pipe or 1-in. copper tubing. The valve has a single, tapered turn plug—only moving part—which can direct water flow to the softener, or directly into the water supply. The simplified by-pass permits ready use of non-softened water for tasks not requiring soft water and makes it unnecessary to shut down complete water supply if softening equipment needs repairs. The valve is reported suitable for cold and hot water installations to 225 F. It costs around $15.00. Clayton Mark & Co.

53—AGITATING DEVICE cleans parts economically

An air-powered, mechanically agitating device for attaching to a 55- or 30-gal drum, or still tank, the Porto-Lif converts the drum into a parts cleaning unit. For limited-budget application, the Porto-Lif employs the same principle of mechanical agitation used by company's Aja-Dip and Aja-Lif cleaning machines. A single lever controls the cleaning operation. A flick of this lever lowers the platform of dirty parts into the cleaning solution, another flick agitates the parts in the solution (140 up-down motions per minute), and a third

Hall Industrial Water Report

VOLUME 7 MAY 1959 NUMBER 3

Take the Simpler Things in Life

What could be simpler than water, air, salt? Or more essential to life? Yet they can destroy steel, copper and other common metals and alloys used extensively in industry.

The Hall engineer is trained to recognize corrosion problems in the making and how to combat them. He can help you locate trouble spots and recommend corrective measures before serious damage has been done. That is one of the reasons why the services of Hall engineers are in demand wherever water is used for boilers, cooling, process or general service.

Corrosion Slows Production

When Hall engineer W. E. Pfeiffer visited a new client he was immediately handed a costly problem. When the weather became extremely cold the part of the plant farthest from the boiler house could not be kept comfortably warm, so that the assembly line had to be slowed.

Although repairs to the condensate return system had been minor, Pfeiffer suspected that corrosion products were interfering with heat transfer and proper circulation in the heating system. His suspicion was confirmed when it was shown that condensate was dissolving iron from the piping.

To control further corrosion and to disperse existing corrosion products, Pfeiffer recommended addition of filming amine (Hagafilm®) to the boiler feed water. As the amine distilled out of the boiler with the steam, it loosened corrosion products and laid down a protective film on the metal surfaces wherever steam condensed. With the initial cleanup period over, heating the whole plant is no longer a problem.

Seeing Spots

A Washington hospital reported to Hall engineer W. R. Greenaway that contamination of steam used in autoclaves was spotting stainless steel surgical instruments plated with chromium and nickel. By examining the instruments with a microscope, Greenaway found the problem was indeed serious. The spots were not just stains, they consisted of clusters of tiny pits.

Corrosion of stainless steel pointed to chloride. None was found in condensed steam samples. Only negligible amounts were present in the water and detergent used for washing. As a last resort Greenaway rinsed with distilled water the cloth used to wrap the instruments. A check on the washings proved the cloth to be the source. Condensing steam in the autoclaves extracted enough chloride from the cloth to cause the difficulty.

The job wasn't quite complete. A trip to the laundry was necessary. There it was found that a compound used in the last rinse was high in chloride. Since this has been omitted there has been no further trouble.

Red Carpet Treatment

Stains and poor dyeing caused by iron oxide plagued a Southern carpet factory. Thousands of yards of woolen yarn had to be reworked and sold at substandard prices.

The call went out for a Hall engineer. H. V. Gedney's quick check of the wash water from the scouring lines showed it to be deep red in color. He then surveyed the plant water system from the intake to the trouble points. After clarification the water was satisfactory. But corrosion increased iron content gradually from the filters through the water heater, storage tank and service lines.

With the problem in focus, Gedney had the plant start threshold treatment for corrosion control with Calgon® Composition TG. The red water problem was stopped almost immediately.

Serious water problems can't always be solved in one day. However, the Hall engineer's training and experience enable him to get at the cause of most troubles quickly.

Water is your industry's most important raw material. Use it wisely.

Protective Coatings

Successful application of most coatings to water storage tanks is limited by several factors: water temperature, coating porosity, abrasion and water contamination. But maintaining the continuity of a coating on submerged portions of tanks is extremely important. The tanks are subjected to an oxygen concentration cell type of attack which tends to center corrosion at breaks in the coating. This can cause rapid perforation instead of slow, even corrosion of the total surface.

The organic barriers can be grouped into three large categories: Elastomers include the natural rubber and synthetic products like neoprene. Thermosetting resins cover the alkyd, phenolic and epoxy groupings plus the newer silicones. Thermoplastic materials embrace the vinyl and vinylidene chlorides and polyethylene plus the various coal tar and asphalt base bitumens. Combinations of various resins, resins and metallics, and resins and bitumens are being used extensively.

In many cases, a coating gives unsatisfactory service because it is not applied properly. All corrosion products and other foreign matter must be removed from the surface to be coated. Sandblasting and wire brush cleaning generally work out better than chemical cleaning unless after-rusting can be prevented.

To summarize, protective coatings can frequently be used to protect water tanks if the proper material is used and adequate care is taken in cleaning the metal surfaces and in applying the material.

Industrial Water Problems Require Special Handling

There are no "stock answers" to industrial water problems. For information on how the Hall System can help you solve your particular water problems, write, wire or call address below.

HALL LABORATORIES
DIVISION OF HAGAN CHEMICALS & CONTROLS, INC.
HAGAN BUILDING, PITTSBURGH 30, PA.
In Canada: Hagan Corporation (Canada) Limited, Toronto

Hall Laboratories—Consultants on Procurement, Treatment, Use and Disposal of Industrial Water

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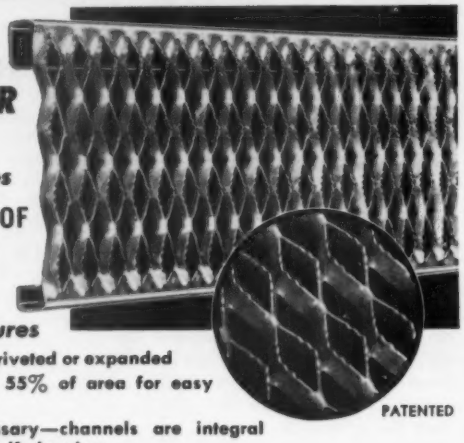
two superior open steel
FLOOR GRATINGS
BY GLOBE

1 Safety GRIP-STRUT®

FOR MAXIMUM SAFETY ALL OVER YOUR PLANT



Important Safety Features

★FIRE PROOF ★SLIP PROOF
★MAXIMUM STRENGTH
★MINIMUM WEIGHT

Important Economy Features

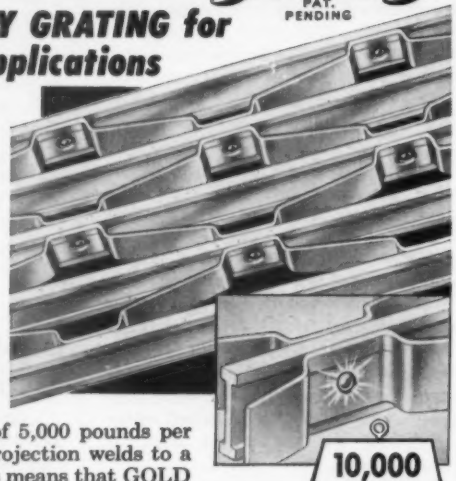
★ All one piece, not welded, riveted or expanded
★ Open space in excess of 55% of area for easy access of light and air
★ No extra supports necessary—channels are integral part of the material. ★ Self cleaning
★ Cut and installed like lumber by your own maintenance force. ★ Low in original cost. ★ For balconies, no secondary sprinkler heads needed

PATENTED

Ideal for work platforms, stair and ladder steps, flooring, balconies, catwalks, machinery guards, fire escapes and for original equipment safety treads.

2 GOLD NUGGET® WELDED grating
PAT. PENDING

The QUALITY GRATING for Heavy Duty Applications



★ 3/16" projection weld nugget for greater rigidity and strength
★ Vertical alignment of the main load bar assured
★ All bars are load carrying bars including secondary bars
★ Anti-skid pattern

PROJECTION WELD

Each secondary load bar (A), as projected welded to the primary load bar (B) has a shear strength of 5,000 pounds per weld. There are 28 such projection welds to a square foot of grating. This means that GOLD NUGGET Welded Grating can sustain greater shock loads than other gratings.

10,000 POUNDS

For the complete details of these revolutionary new gratings, write for new catalogs today. Distributors in all principal cities. Consult the yellow pages in your phone book under "GRATING".

108

PRODUCTS DIVISION
The GLOBE Company MANUFACTURERS SINCE 1914
4016 SOUTH PRINCETON AVENUE • CHICAGO 9, ILLINOIS
For more facts circle 621 on Reply Card

NEW PRODUCTS

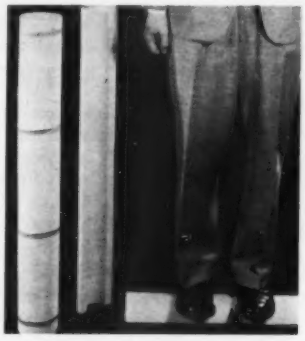
(Begins on page 168)

movement of the lever raises the work out of the liquid. The Porto-Lif operates on air pressure from 30 to 90 psi. Manufacturer says 75 lb of work can be cleaned at one time. Magnus Chemical Co., Inc.

54—FOAM INSULATION for low temperature lines

Substantially greater thermal efficiency is announced for Rigid Foam Pipe Insulation, a pre-molded polyurethane material. Tests are reported to indicate that at a mean temperature of zero F it has a K-factor of only 0.096 Btu per square foot, hour degree F. Formed of a mass of closed cells containing entrapped inert gas, Rigid Form is described as having low permeability, and being noncapillary and dimensionally stable. It is intended to insulate lines in continuous service between —300 and 250 F. For intermittent service or steam out its upper temperature range extends to 275 F.

Rigid Foam is light in weight, pleasant to work with, and surprisingly



strong, according to manufacturer, and is priced competitively with other pipe insulations of comparable efficiency—but because of its low K factor, reduced thicknesses give the same thermal protection. It is applied to piping with steel bands or tie wires and joints are sealed with low temperature mastics. It is now available in pipe sizes ranging from ½ to 12 in. Baldwin-Hill Co.

55—ROOF DECK, long span, low in cost

Fentura is announced as an economical, long span roof deck, capable of spanning up to 32 ft and longer and particularly adaptable to combined office-factory construction. Fentura can be left exposed for industrial applications, loading docks,

SKIL RECIPRO SAW

cuts maintenance labor costs... replaces tedious hand sawing

YOU GET ALL THESE OUTSTANDING FEATURES...

- **Cuts Close to Walls (with off-center blade)**
- **Doubled Blade Life**
- **Low Maintenance (only 3 main moving parts)**

The new Skil Recipro Saw is an entirely new concept in reciprocating saw design—and the first 2-speed unit ever developed.

It cuts anything that can be sawed by hand—faster, easier, and better. To cut metal fast with minimum blade wear, you just set the switch for LOW speed. For fastest cuts in wood and compositions, the HIGH speed setting is used.

Exclusive 2-position shoe doubles blade life. When one blade section is worn, the shoe can be easily repositioned for cutting with a new, unused part of the blade. And the savings in blade costs quickly pay for the saw!

Engineers and maintenance men alike find its remarkable versatility makes this saw an all-purpose unit that replaces all tedious hand, keyhole, and hacksaw operations. And it does it 5 to 20 times faster. In short, the 2-speed SKIL Recipro Saw offers advanced features not found on any other tool.

SKIL

Famous SKIL and SKILSAW products made only by SKIL Corporation, 5033 Elston Avenue, Chicago 30, Illinois. In Canada: 3601 Dundas Street West, Toronto 9, Ontario.

WRITE TODAY!

SKIL Corporation, Dept. PE-59
5033 N. Elston Ave.
Chicago 30, Ill.

Please send me FREE brochure (No. F-14499) containing full specifications of the new SKIL Recipro Saw and illustrating the many ways it can be used.

Name_____
Company_____
Position_____
Street_____
City_____ Zone_____ State_____

For more facts circle 622 on Reply Card

(Begins on page 168)

canopies, but can be finished at any time with lighting troffers for recessed lighting or standard acoustical tiles. The deck comes in 4½, 6 and 7½-ft depths, in 18, 16 and 14 gages to permit the spans of 32 ft and more for certain roof loads. Basic unit of Fentura is company's long span deck which, with its continuous top sheet, is adapted for use as a roof diaphragm against adverse lateral forces by seismic or wind forces. The deck is made available in three types, differing in distribution of metal and method of top or compression, flange stiffening to achieve maximum strength with minimum number of sections. Fenestra Inc.

56—POWER PACK combines silicon charger, battery

Peak d-c power for tripping circuit breakers is reportedly assured by the Auto-Cal Unitized Power-Pack which combines high capacity lead-calcium grid control batteries and a compact silicon charger. The latter (manufacturer's AutoReg) serves to keep the battery (PlastiCal) fully charged automatically, so that a sudden demand for tripping power merely discharges the battery over a short period of time. During the time the breaker is tripped, the battery can also supply necessary constant load current that might be required for pilot lights, holding coils etc. Once the circuit is closed for normal operation, the charger goes to work putting energy back into the battery.

Mounting versatility is a feature. The charger may be mounted on the door of the individual circuit breaker

cubicle; wall mounted near a bank of indoor switchgear or above existing battery racks; or relay rack mounted—or the unitized cabinet of charger and battery may be mounted adjoining outdoor switchgear. The AutoReg Charger is described as a maintenance free, voltage regulated, current limiting charging unit operating from a 115-v, 60-cycle single-phase source. It is noted that the lead calcium grid batteries require much less current than conventional stationary batteries to maintain fully charged condition. Therefore the PlastiCal Batteries are maintained by the charger at slightly higher float voltage values, eliminating equalizing charges. C & D Batteries, Inc.

57—FLOOR TREATMENT aids new or old concrete

Plio Con is formulated to seal, harden and dust-proof new or old concrete floors—to protect and extend the life of concrete. Applied with a lamb's wool applicator or mop, it sets up dust-free in 1 hr, dries to the touch in 3 hr, says manufacturer; and it blends in, allowing for easy touch-up. The Monroe Co., Inc.

58—REGENERATION METHOD improves effluent

The FBR Regeneration Method (for fixed bed reverse flow) is claimed to result in lower electrolyte leakage.

Wherever you use compressed air...
...just
PLUG IN THE POWER
with
HANSEN
Quick-Connective Couplings
As easy as plugging in your electric shaver
To connect the Coupling, just push the Plug into the Socket—with one hand. Flow is instantaneous. To disconnect, push back sleeve on Socket. Coupling disconnects with instant, automatic shut-off of air.
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—a ready reference when you want information on couplings in a hurry. Lists complete range of sizes of Hansen One-Way Shut-Off, Two-Way Shut-Off, and Straight-Through Couplings.
Quick Connection and Disconnection
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Blue section shows how Socket, when disconnected, automatically shuts off air by leak-proof seal of metal valve against rubber valve seat.
Quick-Connective Fluid Line Couplings for
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THE HANSEN MANUFACTURING COMPANY
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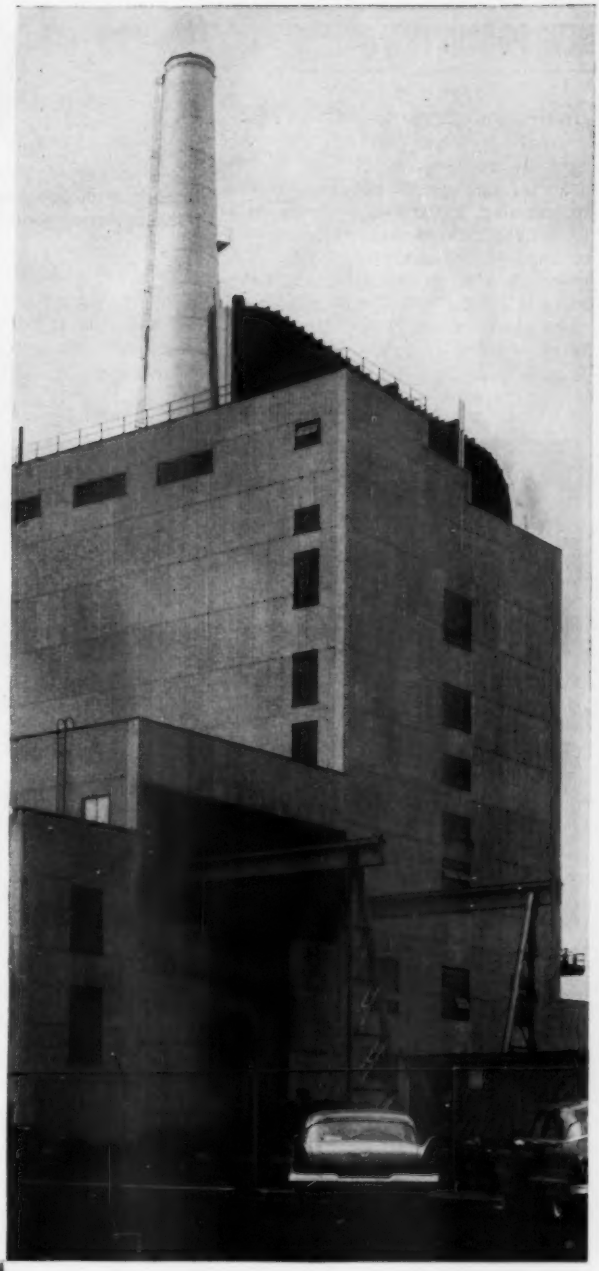

This plant used two ASBESTONE Curtain Walls

The *outer* walls of Jersey Central Power & Light's new Sayreville extension are built with rugged panels of Gold Bond Corrugated ASBESTONE "400". They give the building extra protection against fire, impact and salt air. *Underneath* the Corrugated "400", as a part of the curtain wall, are Gold Bond ASBESTONE Panels, which provide added insulation and a smooth interior wall.

Both products are ideal for use in the chemical, power or paper industries. They're immune to the effects of chemical fumes and moisture and are completely maintenance-free.

Ask your Gold Bond® representative for the full story about Corrugated "400" and ASBESTONE Panels. Or write Dept. PE-59 for free technical bulletins.

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BUFFALO 13, NEW YORK

Gold Bond
BUILDING PRODUCTS

a step ahead of tomorrow

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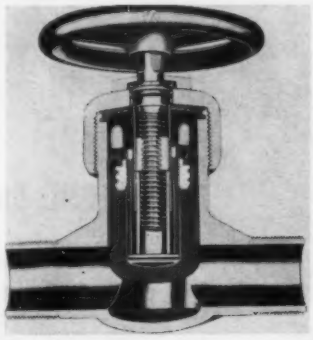
(Begins on page 168)

greater uniformity of effluent and reduced operating cost. It consists basically of a means of flowing regenerant up, instead of down, while maintaining a fixed rigid resin bed to prevent channeling of short-circuiting of regenerant solution. By pumping acid up through bed, band of resin richest in hydrogen is at bottom which is the point the water being treated touches last before leaving unit. This rich band becomes a scrubber zone and reduces leakage —to produce a purer effluent. Chief use of FBR is with high solids waters to get purest effluent possible, says manufacturer, but there are advantages in using it in connection with low solids water where it may permit reduction in equipment requirements. Graver Water Conditioning Co.

59—PLASTIC VALVE designed for tight sealing

In this plastic valve, employing a telescopic arrangement instead of a diaphragm, a soft rubber cup is forced to the concave bottom of the passage. Because of its flexibility, the cup under pressure from the stem, seals on all sides against the walls of the body casing, shutting off fluid flow. On the upper part of the shut-off body is a lipped packing to prevent fluid from contacting the stem or leaking out of valve. The stem is in two telescope type sleeves which slide inside each other, the outer one acting simultaneously as a pressure tube



in the plunger, reinforcing the rubber cup from within. Material flowing through the passage under pressure is not forced out to the side during closure, it is explained, and thus, even under maximum pressure, the cup locates in the position provided. Foreign matter in the line does not impair the valve because the soft rubber cup is flexible enough to accommodate these particles without damage to itself or affecting its sealing characteristics. Valve body, cover, handwheel and soft rubber cup can be supplied in plastic materials suited to the materials handled. For installation in metal or plastic piping systems, this valve can be had with screwed or flanged ends or socket ends. Working pressure is 145 psi, sizes 1 to 4 in. W. S. Rockwell Co.

60—ULTRASONIC UNITS fit specific cleaning needs

In the Glennite Ultrasonic Cleaners, interchangeability of components permits matching of power requirements to volume. Featuring modular design, the line adds up to 13 different cleaners in all. Five tank sizes and six preset generators combine to offer distinct power categories for specific applications based on the volume and number of pieces to be cleaned. Cleaning tanks come in ½ to 25-gal sizes; generators, from 50 to 2000 w. In almost all cases, three ranges of cleaning efficiency (light, average and heavy) are available.

For example, a user requiring a 16-gal tank can fit it with a 500-w generator for light cleaning, a 1000-w

THE ALL-NEW

P&S ROCKER-GLO SWITCH

...the switch that looks right, feels right and is right for every type of wiring job.

Here at last! After intensive testing, Pass & Seymour, Inc., proudly presents *ROCKER-GLO* . . . the *one* switch that answers all your needs.

No matter how you choose to operate the new *ROCKER-GLO*, the merest brush of a finger produces instant action . . . *and ROCKER-GLO glows in the dark!*

AVAILABLE in Despard interchangeable type, Despard type mounted on strap and narrow rocker for tumbler switch plates. A specification grade switch, 15 and 20 amps. 120/277 volts A.C.

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Who Discovers the Discoverers?

"A professor can never better distinguish himself in his work than by encouraging a clever pupil, for the true discoverers are among them, as comets amongst the stars." CARL LINNAEUS

Somewhere in this mighty land of ours, a gifted youth is learning to see the light of tomorrow. Somewhere, in a college classroom or laboratory, a dedicated teacher is gently leading genius toward goals of lofty attainment. Somewhere the mind of a future discoverer—in science, engineering, government, or the arts—is being trained to transcend the commonplace.

Our nation has been richly rewarded by the quality of thought nurtured in our colleges and universities. The caliber of learning generated there has been responsible in no small part for our American way of life. To our college teachers, the selfless men and women who inspire our priceless human resources, we owe more than we will ever be able to repay.

Yet how are we actually treating these dedicated people? Today low salaries are not only driving gifted teachers into other fields, but are steadily reducing the number of qualified people who choose college teaching as a career. At the same time, classrooms are beginning to get overcrowded. In the face of this, college applications are expected to double by 1967.

This is a severe threat to our system of education, to our way of life, even to our very existence as a nation. Our colleges need help—and they need it now!

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If you want to know more about what the college crisis means to you, and what you can do to help, write for a free booklet to: HIGHER EDUCATION, Box 36, Times Square Station, New York 36, New York.

ADVERTISING COUNCIL PUBLIC SERVICE

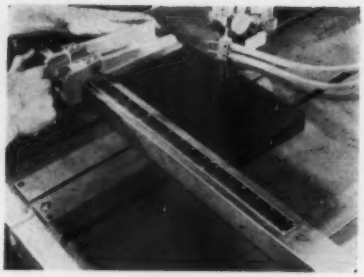
Sponsored as a public service, in cooperation with the Council for Financial Aid to Education

(Begins on page 168)

generator for average cleaning, and a 2000-w one for heavy cleaning. Since the principal cost of the cleaner is determined by the size of the generator, economy can be realized by avoiding purchase of a high powered cleaner for low power cleaning jobs. These cleaners are rated at average, rather than peak power. High temperature ceramic transducers utilized are side mounted for maximum cleaning efficiency. These are capable of operating at 350 F, it is pointed out, permitting use of high temperature liquid agents. Gulton Industries, Inc.

61—CALIBRATED FIXTURE simplifies band machining

Band machine users can cut directly to dimensions with the Universal Calibrated Fixture, it is announced. A standard attachment fitting power table models of company's band machines, it consists of a massive back-up bar that locates in the table T-slots. The sliding head travels along the bar and can be locked at any

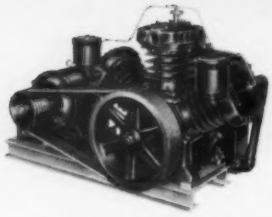


point. The scale on the top of the bar is calibrated over span of 22 in., so that either left or right face of sliding head may be used. By following a simple procedure, the fixture may be removed and replaced to the same setting at will.

Operation is simple. For facing, cropping, cut-off etc., you set the sliding head to the desired dimension, place the work against the back-up bar and sliding head, then cycle the power table to make the desired cut and withdraw. The DoAll Co.

Where the going is TOUGHEST the Curtis keeps going!

Sandiest FOUNDRY conditions haven't stopped this CURTIS AIR COMPRESSOR



The CURTIS C-100 two-stage air-cooled air compressor. 25-30-40 H.P.

- CURTIS-SEAL CRANKCASE
- TIMKEN MAIN BEARINGS
- SELF CENTRO-RING OILING
- AIR COOLED: NO COOL WATER REQUIRED
- PRECISION BUILT

For compressed air—industry depends on *Curtis*. Eliminate production line delays. Get more air faster . . . at lower cost. Where the going is toughest (foundry, factory or shipyard) put the CURTIS C-100 to work and forget it!—Full line of industrial compressors for ordinary and special applications.

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It's easy to obtain product data with the postage-free Reader Service Cards provided on pages 235-236. Use them for information on advertised products, too. Just circle the key number appearing at bottom of the ad.

62—BUS DROP CABLE offers flexibility of use

Improved, flexible Plasticote Bus Drop Cable is introduced to provide greater flexibility in connection of overhead power sources of industrial machine load centers and control boxes. Any number of direct connections may be made with the cable from overhead open or enclosed feeder lines to machinery on the floor. The tough, Plasticote jacket is claimed resistant to acids, alkalis, greases, oils, moisture and abrasion. AWG sizes from No. 14 to 2 available. Chester Cable Corp.

63—ELECTRODE offers performance benefits

Addition of iron powder to the coating of the Fleetweld 7MP, an E-6012 electrode, is said to make it easier to operate and faster than previous E-6012 designs. It is classed as an all-position, a-c and d-c mild steel electrode. According to manufacturer, inclusion of iron powder and certain arc stabilizing ingredients to the coating produces an electrode combining ease of operation, good bead appearance and a-c operation of an E-6013 electrode with higher speeds and lower

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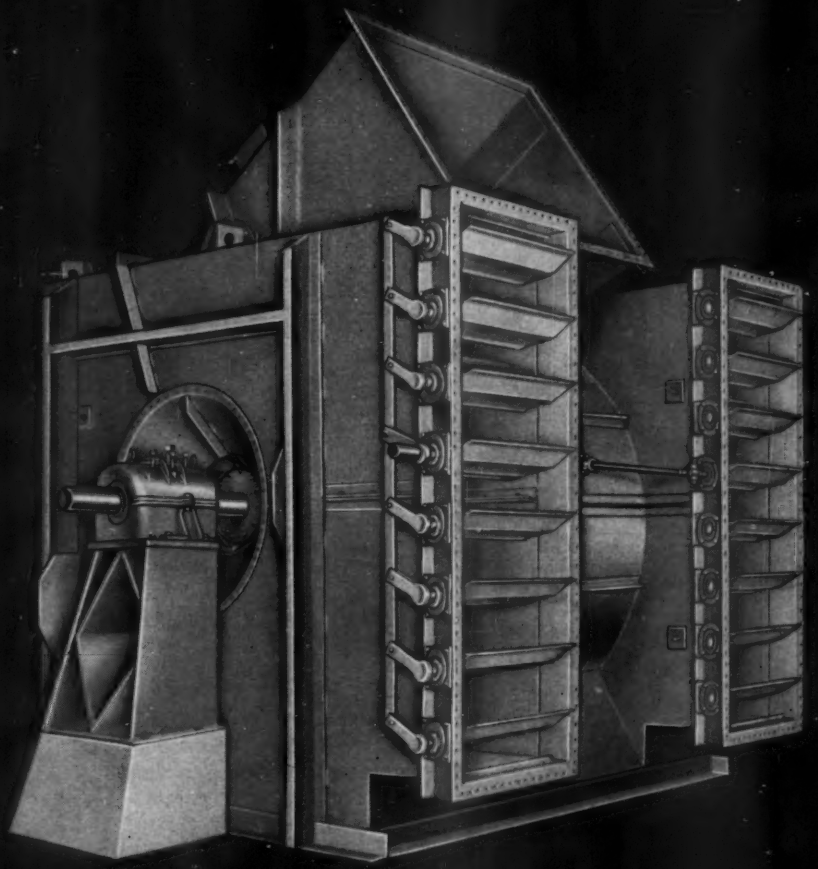

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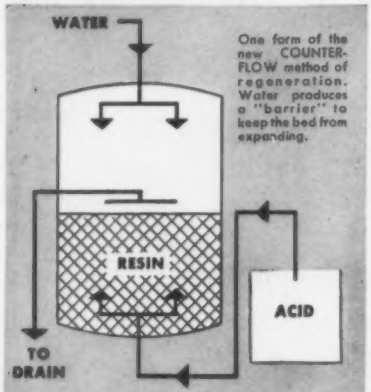
ILLCO-WAY
ionXchange
COUNTERFLOW*
REGENERATION OF
ION-EXCHANGERS


WATER
One form of the new COUNTERFLOW method of regeneration. Water produces a "barrier" to keep the bed from expanding.
RESIN
ACID
TO DRAIN

* "COUNTERFLOW" is the trade mark of Illinois Water Treatment Company equipment utilizing a distinctly new principle of regeneration. Pat. pending.

"COUNTERFLOW" is a method whereby upward regeneration, which has long been recognized as most desirable, is successfully accomplished by establishing a "barrier" at the resin face.

LOOK AT THESE
RESULTS!

- De-ionizer in a power plant. Conductivity of effluent improved from 10 micromhos to 4 micromhos after conversion to COUNTERFLOW. Cation leakage, expected at 4 ppm with downflow regeneration, actually is only 1 ppm.
- Chemical company in Middle West, 480 ppm TDS in raw water. Expected cation leakage with conventional regeneration, 9 ppm; with COUNTERFLOW, only 1.2 ppm.
- Distillery in Middle West. TDS in raw water, 575 ppm. Expected cation leakage with conventional equipment, 6 ppm; with COUNTERFLOW, is actually only 1.5 ppm.
- Western power plant, converted to COUNTERFLOW. Savings in acid reduction, $16,000.00 per year. TDS in raw water, 342 ppm. Predicted cation leakage from curves for conventional design equipment, 4 ppm; with COUNTERFLOW, actually only 1.6 ppm.

ILLCO-WAY
ILLINOIS WATER TREATMENT CO.
840 Cedar St.
Rockford, Ill.

NEW YORK OFFICE: 141 E. 44th St., New York 17, N.Y.
CANADIAN DIST.: Pumps & Softeners, Ltd., London, Ont.
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NEW PRODUCTS

(Begins on page 168)

cost of an E-6012 electrode. Other advantages cited include excellent operation on a-c, even with low, open circuit voltage machines; increased deposition rate; reduced splatter; easy slag removal; good operation at low currents to minimize burn-through on sheet metal. It comes in ⅛ to 5/16-in. sizes, and is priced the same as company's other E-6012 electrodes. The Lincoln Electric Co.

64—ROOF VENTILATORS for up-blast exhaust

Type UB Propeller Roof Ventilators feature high-speed, high-air capacity for up-blast ventilation. Sixteen sizes cover capacities from 3790

to 33,400 cfm. The unit mounts directly over the roof opening for exhaust from duct or open area. It has a totally enclosed, permanently lubricated, ball bearing motor; butterfly damper and airfoil steel propeller with individually replaceable blades. Steel housing and welded steel frame have aluminum finish. Ilg Electric Ventilating Co.

65—JET GUN sprays powdered, fragmented metals

The Mogul Powder Jet Metallizing Gun comes in two types. Model AL-20, for operation without compressed air, is reported particularly adaptable to spraying of ceramics, including alumina and zirconia powders. It is designed to operate at any angle to a complete circle. The feeding mechanism is separate from the spraying head. There is a small electric vibrator, included in the powder hopper, with feeding mechanism and adjusting device which has calibrated settings to provide uniform flow to nozzles.

Model CA-30 with a simultaneously controlled valve, is suggested for spraying hard facing materials. This unit uses compressed air. Powder is fed through a suction method

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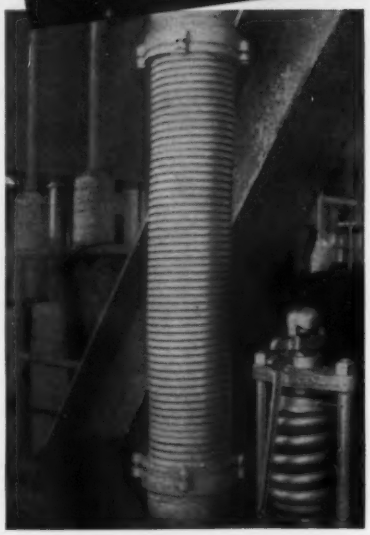
• PREVENTS BREAKS



PENFLEX TUBING ABSORBS THERMAL EXPANSION SHOCKS

Thermal expansion 900°F . . . pressures up to 850 psi. . . . impact and pipe movement under terrific strain, but Penflex safely handles them all. That's the story of Penflex 8" I.D. galvanized steel interlocked tubing welded into the pipeline, eliminating the cost of flanging the joint as well as the pipe. This was installed as an expansion joint on safety blow-off valves.

Wherever thermal expansion, pressures and shock are factors in keeping steam, air, water or chemical lines from breaking you can rely on Penflex Interlocked Tubing and Penflexweld High Pressure Tubing. Available in steel, bronze and stainless steel from ⅛" I.D. to 24" I.D. Write for complete details to Pennsylvania Flexible Metallic Tubing Company, Inc., 7214 Powers Lane, Philadelphia 42, Pa.

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TIGHT AS A PIPE BUT...
FLEXIBLE

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Nothing takes a bigger beating than your floors . . .

Only Masterplate floors take this terrific traffic

...200,000 trips a year over aisles at Lincoln Electric

To withstand heavy fork-lift truck traffic—The Lincoln Electric Company's 30-acre plant uses MASTERPLATE floors in its material transfer aisle. MASTERPLATE "iron-clad" floors provide a thick, tough, malleable surface that can take this day-in, day-out beating.

With MASTERPLATE—Lincoln's high-volume production flow of welding machines and electrodes is not interrupted by costly downtime for floor repairs or replacement.

MASTERPLATE . . . and the on-the-job services of the Master Builders field service team . . . is your key to floors that last *4 to 8 times longer than the best plain concrete floor.* They pay for themselves again and again.

On any current or future floor projects, the local Master Builders field man will welcome discussing your requirements. Call him in. He's at your service. Write us for complete information.

The Master Builders Company, Cleveland 3, Ohio
Division of American-Marietta Company
The Master Builders Company, Ltd., Toronto 9, Ontario
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MASTERPLATE provides a thick . . . tough . . . malleable "iron-clad" floor surface.
CONCRETE BASE SLAB FOR MASTERPLATE surface can be monolithic or two-course.

FOR FINISHING NEW CONCRETE FLOORS or re-surfacing old concrete floors — MASTERPLATE withstands impact . . . is oil resistant and virtually non-absorbent . . . easy to clean . . . resistant to many industrial corrosives and strong cleansers . . . *and outwears the best plain concrete floor 4 to 8 times according to tests by top independent testing authorities.*

2-MINUTE TIME EXPOSURE—using "tracer lights"—shows typical continuous, heavy floor traffic pattern over MASTERPLATE floor at Lincoln Electric Co., Cleveland, Ohio—world's largest manufacturer of arc welding equipment.

MASTER BUILDERS® MASTERPLATE*

*MASTERPLATE *is a registered trademark of The Master Builders Co. for its specially prepared, metallic aggregate for producing "iron-clad" concrete floors.*

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New Way to Stop Faucet Leaks!

★ 9-in-10 washers are fastened with TOO LONG or SHORT SCREWS thus loosen and destroy themselves. Leaks quickly follow!

34 YEARS OF RESEARCH REVEALS NEW SOLUTION

★ New, patented 'Sexauer' SELF-LOCK screws have imbedded expanding NYLON PLUG. They lock at required depth AUTOMATICALLY, hold washers firmly! Made of MONEL, they are rustproof, non-corroding. Heads can't twist off. Screw slots can't distort.

★ NEW, improved 'Sexauer' EASY-TITE faucet washers are made of super-tough, pliable du Pont compound (not rubber or fibre). Reinforced, like a tire, with a vulcanized layer of Fiberglas, they resist distortion and splitting from shut-off grind and squeeze.

★ Faucet leaks repaired with 'Sexauer' EASY-TITE washers and SELF-LOCK screws outlast ordinary repairs "6-to-1"!

HIDDEN COSTS OF FAUCET LEAKS!

Hackensack, N.J. Water Co. and American Gas Association figures prove stopping just ONE PIN-HOLE SIZE (1/32") LEAK saves you 8,000 gal. water quarterly. A HOT WATER FAUCET LEAK repair saves you over $7.58 QUARTERLY in fuel and water bills. Fewer leaks also produce important savings on MATERIALS, LABOR and COSTLY FIXTURE REPLACEMENTS!

A 'Sexauer' Technician will make available our NEW Catalog, Edition "J", listing our entire line of over 3,000 TRIPLE-WEAR plumbing repair parts and tools. He will survey your fixtures, determine the repair parts needed and establish an efficient stock arrangement and control to prevent costly overstocking or shortages. You get this service without obligation. *Act now!*

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SEXAUER
WORLD'S LEADING SPECIALISTS IN PLUMBING AND HEATING REPAIR PARTS

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NEW PRODUCTS

(Begins on page 168)

that keeps compressed air from blowing moisture into the powder feed line. Advantages cited are wider range of particle sizes, greater intensity, unusual concentration and higher deposit efficiency. Metallizing Co. of America.

66—SPRAY GUN, self powered, works anywhere

Jet-Pak is a self contained spray gun for spray application of materials not available in standard aerosol containers. Manufacturer says it sprays any liquid that can be thinned

to proper consistency, including lacquers, stains, enamels and latex paints, as well as lubricants, protective coatings, anti-rust compounds, solvents, adhesives. Jet-Pak costs around $5.00. Extra jars are available, so you can keep a number of liquids on hand ready for spraying with a unit. Sprayon Products, Inc.

67—TESTING DEVICE lets you grade plant lighting

With the pocket-size Lightester you can tell—within a few minutes—whether lighting in a work area is excellent, good, fair or poor. No charts or complicated procedures are involved—merely exposure of a light-sensitive tab in the area under test. Each Lightester has room for eight tests, permitting measurement of different plant areas. The Lightester is available without charge to qualified plant engineers. Smithcraft Lighting.

68—COATINGS include decking, tank lining

Horsey-Set Coatings are announced as including a non-skid waterproof decking which combines resistance to abrasion, moisture, oils, greases, acids, alkalies and salts, and a tank lining which is virtually fumeless, odorless and resistant to penetration from boil-

NOW! custom-made V-BELTS in any length with...

ALLIGATOR V-BELT FASTENERS

SIMPLE AS A, B, C!

When an endless belt breaks, merely cut off the required length of belt from a roll of Open End V-Belting, apply an Alligator V-Fastener and the machine is ready to "roll" again.

DESIGN NEW DRIVES WITH THIS IN MIND . . .

V-belts can now be made to any length . . . center distances are no problem . . . eliminate need for special length belts.

ONE STRONG JOINT

Permits fast and easy installation on all types of drives, particularly fixed center drives and drives with outboard bearings.

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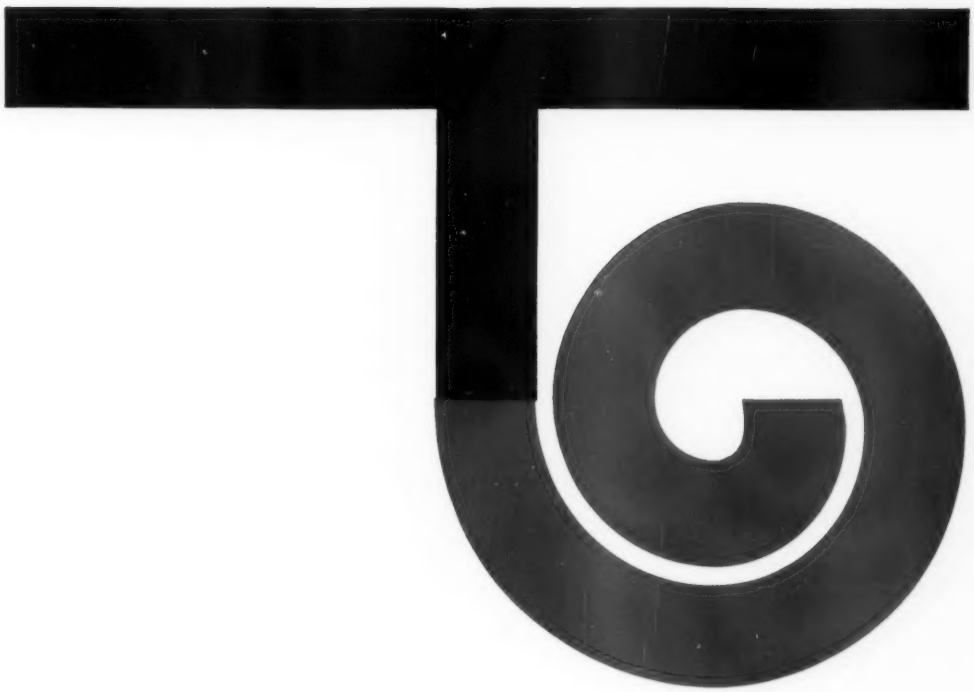
titeflex



titeflex incorporated springfield 4 massachusetts

PACIFIC DIVISION • SANTA MONICA, CALIFORNIA 9198

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"THESE MAINTENANCE TIPS SHOULD END OUR BEARING FAILURES— THANKS TO DISTRIBUTOR DAN THE SKF BEARING MAN"

"Even I can learn something about the proper care of bearings from Distributor Dan—he's an expert," the mechanic told the foreman. "He's showing us the right way to clean bearings. It should help us get better performance from our bearings—including longer life."

Preventive maintenance is one of the many services *authorized* SKF distributors offer. These bearing specialists can also help you simplify ordering, reduce inventory—and give you immediate delivery from their complete and diversified stocks of SKF ball and roller bearings.

But why not find all the ways authorized SKF *distributors can help you keep production running smoothly? Just call the one nearest you.* 5925

Spherical, Cylindrical, Ball, and "Tyson" *Tapered Roller Bearings*

EVERY TYPE—EVERY USE

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SKF INDUSTRIES, INC., PHILADELPHIA 32, PA.

® REG. U. S. PAT. OFF.

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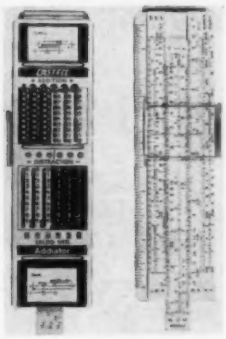
NEW PRODUCTS

(Begins on page 168)

ing water, steam, gasoline, oil and grease. Both products are claimed non-toxic and easily applied with a single coat. According to manufacturer, both are non-aqueaous, solvent free and of a permanent coloring. The coatings have a wide color range and are water- and weatherproof with permanent adhesion, it is stated, and may be used on wood, concrete, steel and non-ferrous metals and asphalt. Horsey-Robson & Co., Inc.

69—SLIDE RULE doubles as adding machine

Addiator-Slide Rule is a pocket-size calculator combining a 13-scale log-log slide rule on one side, and Addiator, a tiny adding machine, on the



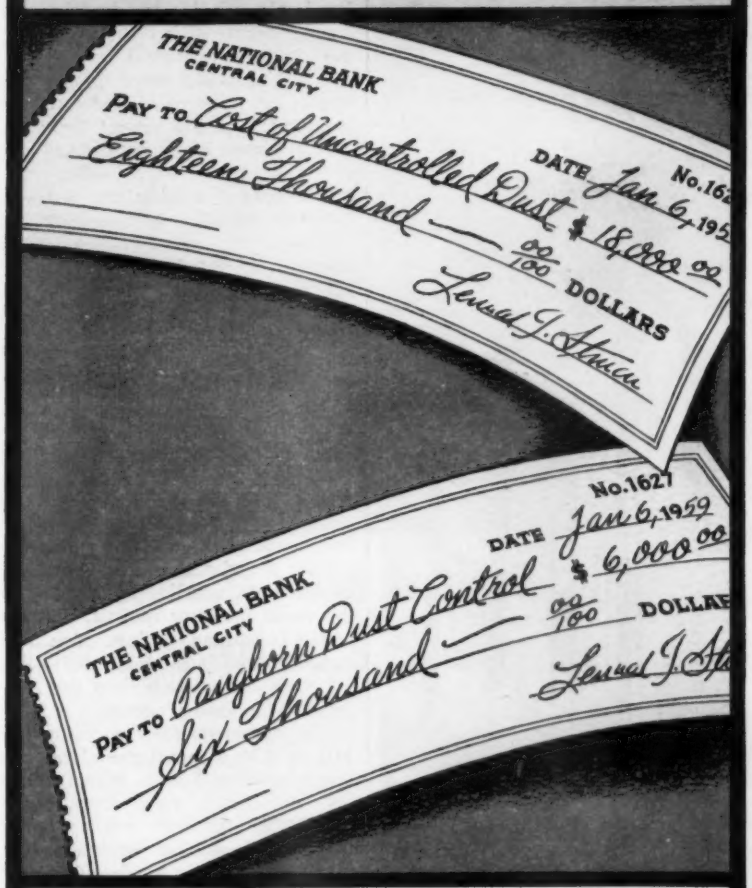
other. The plastic slide rule has a 5-in. scale length, is machine engraved. The Addiator, which adds and subtracts to 999,999, is made of aluminum and brass. The unit costs around $10.00 complete with leather case. Harrison Home Products Corp.

70—MONITORING SYSTEM checks temperatures

For monitoring a virtually unlimited number of points continuously, this compact thermistor-type system is designed to detect and warn when temperature at any protected point reaches a preselected limit. It can monitor temperatures between —25 and 600 F. Sensing circuits, which use no sampling or scanning devices, are terminated in a multiple-channel bridge network which receives and monitors inputs simultaneously and continuously.

The system is designed around two types of modular units; the monitor module which handles inputs from a group of 19 sensing points; and an alarm-indicator module containing amplifier, temperature indicator, alarm circuit and connections for secondary

WHICH CHECK WOULD YOU RATHER WRITE?



How much are you paying for uncontrolled dust?

See for yourself—add up the cost of your lost salvageable material, housekeeping expenses, excess machine wear, intangibles such as community and employee goodwill. Whether your total is moderate or high, Pangborn Dust Control will cost you *less* than uncontrolled dust.

For details on Pangborn's engineering knowledge and experience, talk to the Pangborn man in your area or write PANGBORN CORPORATION, 3200 Pangborn Blvd., Hagerstown, Maryland. *Manufacturers of Dust Control and Blast Cleaning Equipment — Rotoblast® Steel Shot and Grit.*

Pangborn CONTROLS DUST

For more facts circle 636 on Reply Card

Which Size Is Best for Your Water Supply Requirements?

GRAVER

FABRICATES AND ERECTS ALL SIZES... FROM 25,000 TO 3,000,000 GALLONS

The Dependable Source

GRAVER TANK & MFG. CO.

DIVISION—UNION TANK CAR COMPANY

EAST CHICAGO, IND.

Plants and Offices Across America

for Elevated Water Tanks

For more facts circle 637 on Reply Card

NEW PRODUCTS

(Begins on page 168)

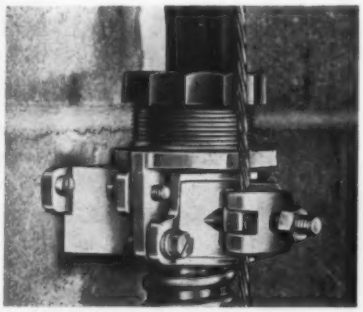
switching or control functions required during an alarm condition. Each alarm-indicator module can handle inputs from 10 monitoring modules, representing a capacity of 100 sensing points per amplifier. The system can be supplied to detect temperatures: above a pre-set limit; below a preset limit; out-of-band between upper and lower limits.

For normal applications, a transistorized amplifier is furnished; for extraordinary service conditions, a hermetically sealed magnetic amplifier can be supplied. At present, the system is available only with manual means for identifying and indicating the temperature of the trouble point. In operation, the input from each group of 10 probes is fed to the monitor module. Whenever electrical resistance of any thermistor probe reaches an abnormal value (representing an abnormal temperature) it produces the current which is amplified in the alarm-indicator module to actuate the alarm circuit. The alarm condition is signalled by a light on the alarm indicator module, plus associated warning devices. You find trouble point by switching each sensing probe successively into the temperature indicating circuit.

The system operates on 60 cycles, 110 or 220 v input; the alarm system is rated at 5 amp. Manufacturer says the cost is equal to or lower than other presently available systems—continuous or scanning—and that maintenance cost should be appreciably lower. Fenwal, Inc.

71—VERSATILE FITTINGS for armored cable

Consisting of a basic connector and interchangeable accessories, these malleable iron or aluminum fittings



can be adapted to a variety of applications. The basic connector is applicable to most terminations. Having twin, independently bolted saddles

ELIMINATE TRAMP IRON in liquid pipelines

ERIEZ

permanent non-electric magnetic

FERROUS TRAPS

ULTIMATE PROTECTION against fine iron and tramp iron contamination for most liquid-handling pipelines. Ideal for installation in food, chemical and ceramic applications. Protect product purity. Increase production. Prevent abrasive wear; reduce damage to filters, mixers, pumps, etc. Made with strong, one-piece cast bodies, Ferrous Traps withstand pressures up to 150 psi. Provide greater magnetic area than all previous models. Effective with materials up to 750°F. Quickly pay for themselves. Two types: standard stainless steel models and highly polished sanitary models.

MAGNETIC STRENGTH IS GUARANTEED FOR LIFE • QUICKLY, EASILY INSTALLED IN ANY POSITION • CLEAN, SIMPLE DESIGN HAS NO MOVING PARTS • MAGNETIC ELEMENT LIFTS OUT IN SECONDS FOR INSPECTION OR CLEANING • ADAPTABLE FOR LINES FROM ½" to 4".

Free literature has complete installation and application information. Write today to: Eriez Mfg. Co., 71-S Magnet Dr., Erie, Pa.

ERIEZ

For more facts circle 638 on Reply Card

THE U.S. TREASURY SALUTES THE AIRCRAFT INDUSTRY

—and its thousands of employees who help strengthen America's Peace Power by buying U.S. Savings Bonds

Men and women who make up the great group who design, fabricate, assemble and test our newest aircraft are also making another substantial contribution to our national security. Many thousands of them are buying U.S. Savings Bonds, regularly, through the Payroll Savings Plan.

Regular purchases of Shares in America help these patriotic and thrift-minded people set up substantial reserves for the education of their children, the buying of new homes and the building of their retirement funds. Through the Payroll Savings Plan the practice of thrift is made easy and automatic.

If your company has not yet put in a Payroll Savings Plan, start now. Your State Savings Bond Director is anxious to help and to show you how easy it is to put the Plan to work. Telephone him now. Or write to Savings Bonds Division, U.S. Treasury Department, Washington, D. C.

L. A. MARTIN, skilled aircraft mechanic, is typical of the thousands of valued employees in this field who are buying U.S. Savings Bonds regularly. Mr. Martin, through his company Payroll Savings Plan, is making a personal contribution to the Peace Power of his country.

PLANT ENGINEERING

THE U. S. GOVERNMENT DOES NOT PAY FOR THIS ADVERTISEMENT. THE TREASURY DEPARTMENT THANKS, FOR THEIR PATRIOTISM, THE ADVERTISING COUNCIL AND THE DONOR ABOVE.

ADAMS FACT FILE #2

PLANT AIR

Moisture Chief Cause of Trouble . . .

Every company today is looking for ways to offset the increased costs of labor, material, equipment and services. At a gasoline station you expect "Free Air", but in industry it is a major expense. Perhaps in your own plant, for an investment in a few minor compressed air system alterations, significant savings are possible.

Water, sludge, rust, oil and dirt in compressed air systems are prime causes of maintenance and production down-time. Water vapor condensing in air lines tends to corrode the piping. Also, water present in the piping may freeze during winter, causing serious reduction of compressed air supply. Such restrictions are often difficult to locate and thaw. This same line moisture may emulsify lube oil destroying its lubricating value and the resultant mixture has high fouling characteristics. Frequently, ice will form within the tool itself since expanding air cools the moisture . . . tool efficiency will be seriously affected.

Some of the Other Problems Created By Wet Compressed Air . . .

Wet compressed air is not only a construction and production tool problem. Faulty paint jobs, contaminated chemical and food products can often be traced to moisture laden compressed air. Waterhammer, unequal pipeline thermal expansion and line leaks also result from collected moisture. In addition, air lost through traps, and in blow-down of compressed air lines provide no useful work . . . represent a sizeable power loss.

You Can Lick Compressed Air Moisture Problem . . .

All of these hidden costs can be virtually eliminated by the installation of an Adams Aftercooler and Cyclone Separator between the compressor and receiver tank. By cooling discharge air to within 10° F. of cooling water temperature — guaranteed with Adams standard Aftercoolers — the moisture can be removed at the separator. Pressure loss is less than one-half pound on these units including the separator. In severe cases, moisture removal of over 90 per cent can be obtained by cooling the air with Adams 2° Aftercooler to within 2° F. of water temperature.

Air Filter for Final Protection at Point of Use . . .

As an added safeguard for expensive tools and equipment, an Adams Poro-Stone Air Filter should be installed just before the air is used. These filters remove all solid material picked up by the air stream. With an Adams Aftercooler, Cyclone Separator and Air Filters clean, dry, trouble-free air is supplied to your production tools. You get continuous service with minimum maintenance.

For further information on how the complete line of Adams air equipment can solve your compressed air problems, write today for your free copy of Bulletin No. 712 on Aftercoolers and Bulletin No. 117 on Poro-Stone Air Filters from the R. P. Adams Company, Inc., 254 East Park Drive, Buffalo 17, New York.

For more facts circle 640 on Reply Card

NEW PRODUCTS

(Begins on page 168)

and double armor stop, it can accommodate a wide range of cable sizes. Addition of a Neoprene bushing, retainer ring and gland nut to the connector makes it water tight, it is noted. The accessories—ground fitting, support clamp, and mounting bracket—are used to install external ground connectors and jumpers around enclosures. Fittings take cable ½ to 4 in. OD. Thomas & Betts Co.

72—BALL ACTUATED VALVE is slim, streamlined

Only 1 in. thick and 3 in. wide, the Quick-As-Wink Ball Actuated Spring Return Valve is streamlined in appearance and can be mounted on machinery even when space is limited. For air, oil or water service, pressures to 125 psi, temperatures to 150 F, these valves are furnished tapped either ⅛- or ¼-in. pipe connections. According to company, the

valves can be adapted to many mechanical applications and offer advantages over typical cam operated valves due to flexibility of mounting and elimination of links and other operators. The ball actuator can be depressed from any peripheral point of 360 deg as long as the valve plunger is given its full ⅛-in. travel. Overtravel of 1/32 in. is provided.

These valves are furnished in three-way "normally closed" or "normally open" and four-way actions. They have solid aluminum housing, stainless steel plunger. They can be manifolded together, without use of special parts, in any of four 90-deg angle positions. Hunt Valve Co.

73—POSITIONER affords remote, automatic control

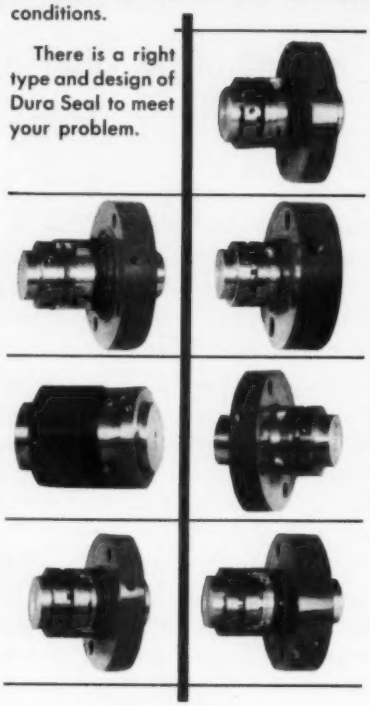
Transistorized circuitry, printed circuit techniques and cabinet design are features of the D-52 Diatrol, a low cost remote position control. It

DURA SEAL
means
VERSATILITY
in mechanical sealing

Dura Seal is the most extensive line of mechanical seals offered to industry today . . . meeting a wider range of pressures, temperatures and liquids.

Dura Seal is backed by 25 years of experience in the successful sealing of corrosive, volatile and abrasive conditions.

There is a right type and design of Dura Seal to meet your problem.



For further details, write for free copy of Catalog No. 480 PN

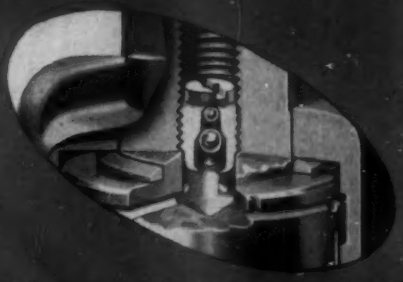
The PERFECT SEAL TRADE MARK

DURAMETALLIC CORPORATION
KALAMAZOO, MICHIGAN

For more facts circle 641 on Reply Card

In the spots that count...Homestead Valves are

LEAKPROOF



Reinforced Teflon and lubricant seal

Controlled pressurized lubricant seal

Lower cost per year valve service is guaranteed by Homestead Lubricated Plug Valves. These are the features that make them leakproof and extend their useful life . . . reinforced Teflon* head seal, double ball and lubricant sealed check valve, and their exclusive controlled pressurized lubricant seal.

Homestead's controlled lubricating system forces a chemical film over all sealing surfaces at more than 300 pounds pressure. In addition, it prevents sticking, by its piston-like movement of the plug during each lubrication. See how Homestead fills your valve needs. Write today for Reference Book 39, (Section 5), for complete information on Homestead Lubricated Plug Valves.

*DuPont registered trademark.

h
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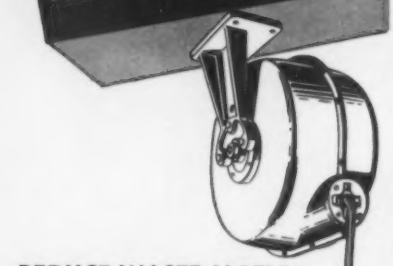
HOMESTEAD VALVE MANUFACTURING COMPANY

P. O. Box 207 • Coraopolis, Pa.

For more facts circle 642 on Reply Card

BOOST WORKER EFFICIENCY with WAYNE HOSE REELS



REDUCE WASTE MOTION
CUT HOSE COSTS
IMPROVE SAFETY

Get more production per worker with Wayne Retriever Hose Reels . . . engineered to reduce wasted motion. Easily installed . . . easily reached—overhead, underbench, floor or beside bench—Wayne Hose Reels have proved themselves "production boosters" in all types of plants.

Wayne Hose Reels work like a window shade. Ratchet holds hose at any desired length. Slight pull on hose releases catch and hose rolls back automatically to pre-determined setting. Ruggedly built for hard continuous use.

Write for technical data and folder to . . .

THE WAYNE PUMP CO.
Industrial Division-Fort Wayne 4, Ind.
Division Symington Wayne Corp.

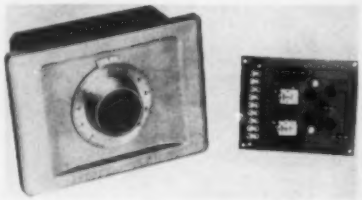
Wayne
HOSE REELS

For more facts circle 643 on Reply Card

NEW PRODUCTS

(Begins on page 168)

is introduced for accurate control, both remote and automatic, for valves, variable displacement pumps, machine tools or variable speed drives. It transmits control signals to a shaft mounted actuator which may be slipped on a control shaft in place of a standard hand wheel or lever. The command is set in on a dial as

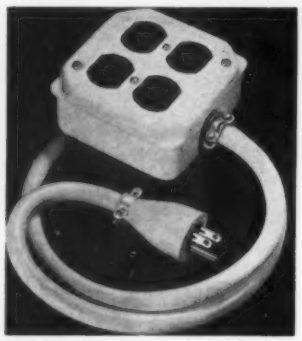


shown, or on a counter type setter. Automatic control may be provided by liquid level, dancer roll, pressure transducer or other signal devices. Manufacturer points out that the controller is weatherproof with Neoprene gasket between aluminum cover and steel cabinet. The Jordan Co., Inc.

To receive product data circle item numbers on the handy Reader Service Cards provided on pages 235-236.

74—OUTLET BOX for heavy duty application

This outlet box is designed to eliminate the need for many long lengths of cord. As many as four power tools, lights, etc., may be plugged in at the



point of use. The No. 14 cable in 25- or 50-ft lengths is standard, and six different receptacles are available. The metal box is covered with a thick coating of yellow colored Neoprene rubber, which has a high dielectric strength. The Ericson Mfg. Co.

(More New Products on page 254)

Master
PADLOCKS
for industrial protection!

Famous Master Laminated Padlocks

Multiple steel plates . . . stronger than a solid block! Genuine brass-cylinder, pin-tumbler security. No finer padlock protection.

Stainless Steel Combination Padlocks

Double-wall construction . . . 3 number brass locking mechanism. Available with "Key-Control" — one control key opens all locks.

Special Long or Short Shackles

For switch boxes, chains, truck or freight car doors, and other uses where special shackle lengths are more desirable.

Speedy Service on Keyed-Alike and Master-Keyed Sets

Master's Service Department is geared for fast delivery . . . in emergencies, special orders are on the way within hours!

FREE BROCHURE

Condensed, easy to use information on the Master padlocks most widely used for industrial applications. Write today.

Master Padlocks
EVERY ONE AN OUTSTANDING VALUE

Master Lock Company, Milwaukee 45, Wis.
World's Largest Padlock Manufacturers

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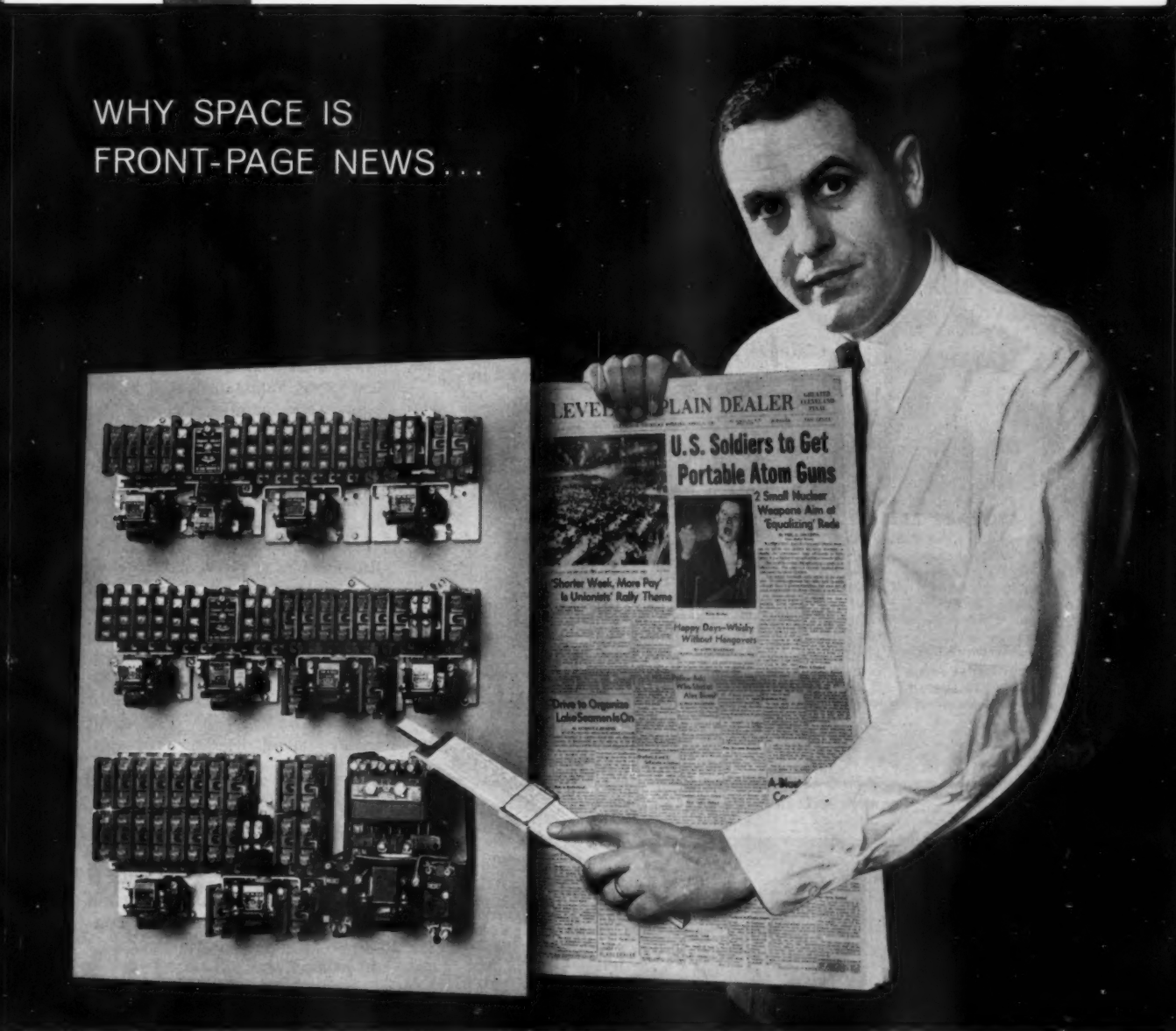
For more facts circle 642 on Reply Card


WHY SPACE IS
FRONT-PAGE NEWS...
PLAIN DEALER
U.S. Soldiers to Get Portable Atom Guns
2 Small Nuclear Weapons Aim at 'Equalizing' Reds
'Shorter Week, More Pay' Is Unionists' Rally Theme
Happy Days—Whisky Without Hangovers
Drive to Organize Lake Seamen Is On

Compact Clark Relays control 72 circuits from panel area smaller than a newspaper

In this day of space exploration and space economy, it's news—front page news—when you can get 72 separate, controlled circuits all on a panel no larger than 15″ x 20″.

Clark Controller, with the most complete and integrated line of control relays available today—convertible pole, latch, universal pole, and time delay—does it! And only Clark offers such a wide range of operation, so many contacts, in a panel area of such small size.

Shown mounted here with the Clark Size 1, Type "CY" Starter are 10 compact Clark Relays which include four time delay contacts (two normally open, two normally closed), 52 instantaneous contacts (14 normally open, 14 normally closed, and 24 convertible), plus 16 latching contacts (all convertible).

The same engineering leadership and superior workmanship that made Clark Controller the *standard of quality* for controls in heavy industry, is inherent in the broad line of Clark Relays for modern panels.

The "modular construction" of all Clark "PM" Relays insures integrated uniformity, compactness and flexibility. Functional alignment in mounting results in neater, more uniform panels and most efficient utilization of valuable space. And because "PM" relays are available in a wide variety of pole combinations, providing up to 14 contacts on a single relay, you can control more circuits—save on relay requirements.

For more information on the complete line of Clark "PM" Relays which is making space-saving headlines, contact your nearest Clark Controller sales office or distributor. Or, write direct to Clark Controller for free bulletins.

The CLARK CONTROLLER Company

Everything Under Control • 1146 E. 152nd St. • Cleveland 10, Ohio

IN CANADA: CANADIAN CONTROLLERS, LIMITED • MAIN OFFICES AND PLANT, TORONTO

For more facts circle 645 on Reply Card

Quality cans
EAGLE SAFETY CANS

The approved *safe* way to handle flammable liquids • Listed by Underwriters Laboratories • Approved by Factory Mutual • Uncommonly rugged for hard use • 'The Complete Line'

STYLE I STORAGE CAN

1 qt., 2 qt., 1 gal. sizes with trigger-grip handle . . . 2½ gal., 5 gal. sizes with free-swing handle . . . valve operated by handle gives positive pouring control . . . no waste, no splash, no spill . . . strong quality construction.

ORDER FROM YOUR SUPPLIER

STYLE II FILLER-DISPENSER CAN

2½ gal., 5 gal. sizes with free-swing handle . . . flexible spout for easy pouring . . . body and breast each seamless drawn from heavy 24-gauge steel . . . steel hoop reinforces bottom . . . fire screens in pour spout and filler opening for double fire protection.

Write for free catalog showing Complete Eagle Line

EAGLE MANUFACTURING CO. Wellsburg, W.Va.

Serving Industry Since 1894

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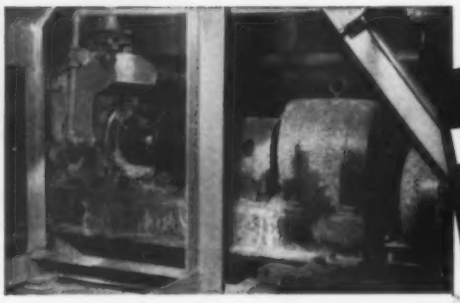


This Nagle Pump IN OPERATION 2 YEARS

—REPLACED A PUMP THAT LASTED 2 MONTHS

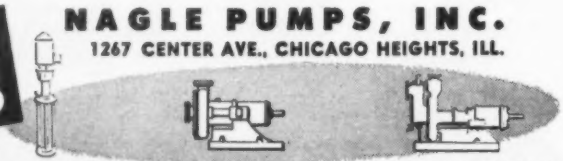
A leading manufacturer of household appliances* installed this Nagle 1" type H-A-W horizontal shaft pump over 2 years ago and it's still going strong. It is in the Bonderizing Dept., shown, handling phosphate slurry at the rate of 10 GPM, against a 25' head. Pump is self-priming. Simple slippage seal adjustment. Readily accessible stuffing box. Pump it replaced lasted less than two months. If you have an abusive pumping problem Nagle Pumps can cut your costs too! Send for "Pump Selector".

*Details on request.

NAGLE PUMPS

NAGLE PUMPS, INC.

1267 CENTER AVE., CHICAGO HEIGHTS, ILL.



PUMPS FOR ABRASIVE AND CORROSIVE APPLICATIONS

For more facts circle 647 on Reply Card

Computers Run Your Plant

(Continued from page 107)

be able to maintain the computer as well as the many processes it monitors."

The emphasis, definitely, will be on maintainers with a high degree of electronic know-how. It is true, of course, that as with the more common electronic brains, the brain-makers will likely be on call (or perhaps, maintain a staff at the plant). But maintenance will be expected to handle more control repairs.

Let's take a closer look at a simplified computer control set-up . . . which maintenance must be prepared to handle.

Involved is a valve, its air-actuated diaphragm, and a pneumatic controller which is run by computer voltage and which in turn adjusts the valve's diaphragm.

Since computer control is automatic, you can expect many more valves and metering devices than in presently manually-run processes. Involved, too, will be whole phalanxes of converter units: units which translate electrical signals to air pressures. Or, air pressure to electrical signals.

Shrugs an engineer, "Maybe it sounds like a contradiction, but it'll take a more complex system of controls to simplify process operation —by computer."

Riverside Cement Co., for one, looks ahead to its new computer's continuous operational log . . . recording variables in temperatures, gas flow and rotational speed of the plant's rotary cement kilns are just a few that come to mind.

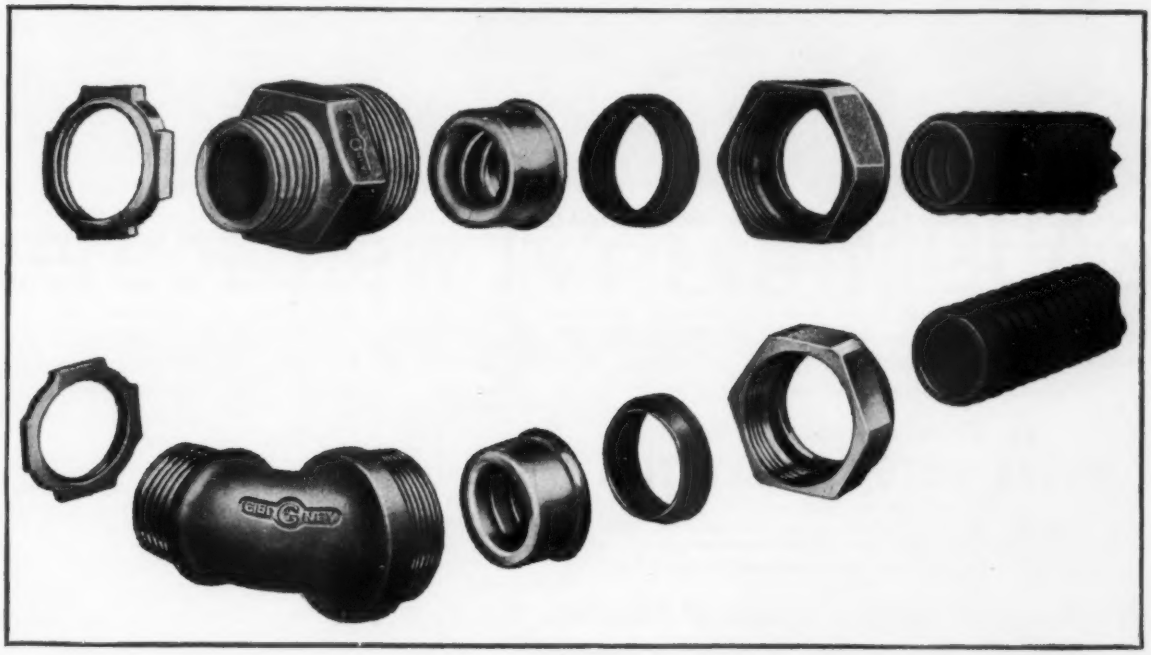
"If anything," says a Riverside Cement spokesmen, "our maintenance staff will have in hand data never before available in our industry."

More precise and tedious maintenance? You can expect it. . . when plant processes are computer-run. But the computer itself will tend to simplify the job . . . through analytical data which will become a kind of trouble-shooting text book for the maintenance staff.

Regardless, the handwriting's plain on many a plant wall: sooner than you probably think, transistor-brained robots will be running your plant and its processes. **End**

For absolutely Liquid-Tite Connectors specify

GEDNEY— every time!



THESE ARE THE NEWEST, most efficient liquid-tite connectors available today for use with Sealtite* and equivalent liquid-tite conduits. Designed to give wiring installations absolutely dependable protection in these popular oil- and water-tight flexible raceways, Gedney Liquid-Tite Connectors are built for lifetime service.

As shown from left to right in the exploded views above, Gedney Liquid-Tite Connectors consist of:

1. **Locknut—nut stock steel—cadmium-plated**
2. **Main Fitting—straight, 90° angle, or 45° angle—malleable iron—cadmium-plated**
3. **Grounding Bushing—one piece—threaded to engage conduit spiral**
4. **Molded Vinylite sealing ring—pliable—ever-lasting**
5. **Gland Nut—malleable iron—cadmium-plated**

Standard sizes range from ⅛" to 2" straight, 45° and 90° . . . order Gedney Liquid-Tite Connectors for top safety and longest life.

* *Sealtite is the trade name of American Metal Hose Branch of the American Brass Company*

GEDNEY FITTINGS FIT!

GEDNEY
ELECTRIC COMPANY

GEDNEY

RKO BLDG., RADIO CITY, NEW YORK 20
Foundry, Factory and Shipping Point: Terryville, Conn.

For more facts circle 648 on Reply Card

ALL MUSCLE — NO FAT!

BROOK NEMA RERATE, TOTALLY ENCLOSED, FAN COOLED A.C. MOTORS

Take less space, weigh less, smaller frames than the Brook standard totally enclosed fan cooled motors—yet, performance is equal. 1 to 40 HP*. Built to N.E.M.A. specifications for rerated motors. Same resistance to dust, fumes and moisture as the larger, heavier, standard frame t.e.f.c. motors. Maximum economy and lower first cost because of Brook modern production techniques and world-wide volume distribution. Warehouses, Sales Representatives, and Dealers throughout the country. Write for literature.

*Standard frame t.e.f.c. motors available 1 to 600 HP.

Since 1904

world's most respected motor

BROOK MOTOR CORPORATION

3302 W. Peterson Ave., Chicago 45, Illinois
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250 University Ave., Toronto, Ontario

BROOK MOTOR CORPORATION

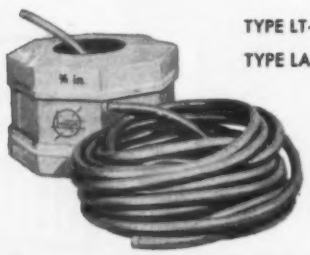
For more facts circle 649 on Reply Card

All the installation speed of Flexible Conduit . . . All the protection of Rigid Conduit . . . with

LIQUATITE®

Extruded Polyvinyl Jacket Molded to Galvanized Flexible Conduit

Complete protection against any and all contamination—impervious to water, oils, chemicals, corrosive atmospheres. Installed in minutes. No more "down-time" due to wiring shorts or burn-outs, no more periodic wiring replacements.



TYPE LT—JIC Approved

TYPE LA—Underwriters' Approved

Write for free sample, costs and name of Distributor nearest you.

LIQUATITE®

ELECTRI-FLEX COMPANY

P. O. BOX 128-I • ROSELLE, ILLINOIS

For more facts circle 650 on Reply Card

Microfilm—An Engineering Tool

(Continued from page 133)

ducibles to an outside vendor. The vendor is furnished a set of cards and full-size prints are obtained by referring to the microfilm number to order the correct print.

However, because the Ravenswood works is not near any large metropolitan area and cannot obtain fast service, we maintain our own reproduction center for emergency service. Balance between in- and off-plant service is maintained by retaining enough in the plant to keep one man busy. This keeps equipment busy and one man trained and ready for emergencies. This arrangement works out well; it keeps both the work load and work force at a constant level.

The department can turn out a full-size print from microfilm in 30 minutes when necessary. In practice it was found that one day service is usually satisfactory.

Total expenditure for capital equipment at the Ravenswood works was $6,800.00. This includes an enlarger, a vacuum frame, a print washer and a dryer. This figure also includes the necessary storage tanks, trays, sinks, etc. **End**

Right Place, Right Part and Worker

(Continued from page 139)

tion, the line driven by the 5-hp motor moves three to 35 ft per hour, precisely controlled within these limits by a rheostat. On "intermittent" operation the 15-hp motor can be timed to start-up or stop the line at various intervals. A "stop" button halts the line.

Speed control is actually regulated by production schedules. If, for example, the Air Force wants X number of F-102s during December, line speed is set to deliver this number.

Utilities: spaced along and beneath the line are air pits. These feed, via reel, mounted hose, the air mains of the line, each platform being connected with special quick-disconnect air fittings. One 100-amp trolley bus carries the electrical feeds, via a collector, powering the main line and its generally lighter tools. The other trolley bus of 225 amp capacity, on shuttle's farline side, supplies the shuttle line's heavy equipment, also by a collector. **End**

new roof or

reroof: new 1¾" FOAMGLAS®

roof insulation for longlife efficiency at low cost

A low cost way to give your next roof a new lease on a long life. That's Pittsburgh Corning's NEW 1¾" FOAMGLAS roof insulation.

The NEW FOAMGLAS thickness brings the unique benefits of the only cellular glass insulation to the many roofs requiring less than 2" insulation. And its cost is 25% lower. This means FOAMGLAS without a vapor barrier now costs the same installed as other less effective roof insulations requiring a vapor barrier.

And NEW 1¾" FOAMGLAS brings you this unique combination of performance-proved benefits: it is dimensionally stable, can't burn—and is moisture- and vapor-proof to insure constant insulating value for the life of your building. It is strong enough for all roof and traffic loads. No other insulating material can approach this combination of benefits.

Next time you insulate a roof, specify FOAMGLAS roof insulation. Write Pittsburgh Corning Corporation, Department PE-59, One Gateway Center, Pittsburgh 22, Pennsylvania, for our new building insulation catalog. In Canada: 3333 Cavendish Boulevard, Montreal, Quebec.

PITTSBURGH pc CORNING

For more Facts circle 651 on Reply Card

NIAGARA MOHAWK POWER CORP.* prevents GAS AND COAL DUST ACCUMULATION with

DUSTEX COLLECTORS

Engineers of Niagara Mohawk Power Corp., Buffalo, N.Y., prevented an accumulation of explosive gas and dust at its Huntley Steam-Electric Station — with two Dustex Miniature Cyclone Collectors ventilating bunkers and hooded belt transfer points. Results — gas removed — fines salvaged and returned to bunker continuously. No visible discharge from stacks! Maintenance — none to date, thanks to Dustex high-efficiency, non-plugging design which employs no filters, and Dustex Vacuum Valves which have no moving parts.

SEE FOR YOURSELF the efficient performance of Dustex on your job, at no obligation. Write today for Dustex Bulletin "A Simplified Determination Test."

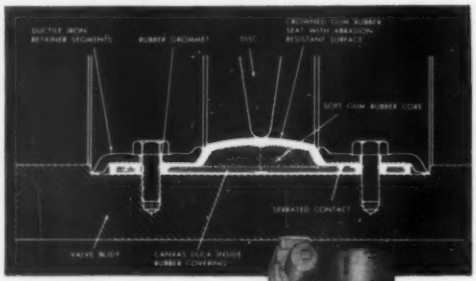
*Contractors: STONE AND WEBSTER ENGINEERING CORP.

dustex CORP.

P. O. BOX 2520 • BUFFALO 25, N. Y.

For more facts circle 652 on Reply Card

DRIP-TIGHT SHUT-OFF *with* ROCKWELL *BUTTERFLY VALVES*



The matchless new "Wedge-Lock" rubber seating provides drip-tight shut-off in Rockwell Butterfly Valves. Its unique construction makes leak-proof closure sure and safe. Valves can be made with full rubber lining.

Other advantages—minimum restriction to flow, positive manual or automatic control, easier installation in less space, minimum maintenance.

Made in all sizes, in 25-, 50- and 125-lb. service in all industrial applications.

Write for Bulletin 582.

ROCKWELL SINCE 1888 BUILT

W. S. ROCKWELL COMPANY

Valves - Butterfly · Slide · Diaphragm · Special

2929 ELIOT STREET, FAIRFIELD, CONN.

For more facts circle 653 on Reply Card

New Plant Construction

(Continued from page 150)

cago, Ill., has authorized a construction and remodeling program to expand company's bakery division here. It will include installation of a bread production line and major changes in the methods of bun production at a cost in excess of $750,000.

Hanover, Pa.—National Can Corp., 3219 W. 47th Place, Chicago, Ill., plans to erect a 125,000-sq ft can manufacturing plant. Construction will get under way at once at a cost in excess of $1 million.

Philadelphia, Pa.—Food Fair Stores, Inc., this city, plans to construct a plant for the preparation and warehousing of sea food of all kinds for company distribution through its many stores and super-markets. Construction of the new facility is already under way and should be completed by late fall of this year at cost of $300,000.

Counce, Tenn.—Tennessee River Pulp & Paper Company plans to build a $30-million kraft paper liner plant on a 1600-acre building site on the Tennessee River, in this city. Construction of the new facilitiy will begin in the summer of this year for scheduled completion by January 1961.

Beaumont, Texas—Magnolia Petroleum Co., subsidiary of Socony Mobil Oil Co., N. Esperson Building, Houston, Texas, has awarded a contract to the M. W. Kellogg Co., 711 Third Ave., New York, N. Y., in the amount of $25 million for the construction of a high purity ethylene, propylene, and butadiene plant on large building site located here.

Falls Church, Va.—Melpar, Inc., 3800 Arlington Boulevard, Alexandria, Va., plans to construct a plant for the manufacture of electronics, electronic devices and communications on building site recently acquired at this location. Plant will be a three-story steel and concrete structure with a working area of 120,000 sq ft, and will include an electronic research plant and office addition.

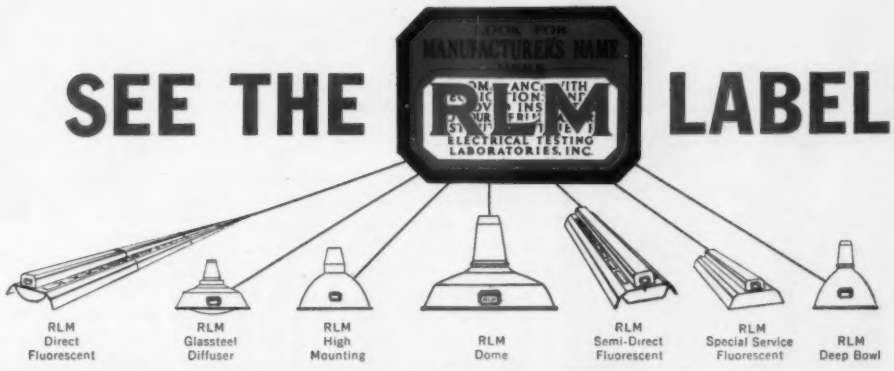
Winchester, Va.—Crown Cork & Seal Co., Inc., Can Division, 9300 Ashton Rd., Philadelphia, Pa., plans to construct an 80,000-sq ft can manufacturing plant, here, for the production of containers for packers in the apple producing area of Winchester, Va.

Kennewick, Wash.—California Spray Chemical Co., Richmond, Calif., plans to construct a nitric acid plant and ammonium nitrate plant on large site here. Work on the new facilities is already under way and are scheduled to be completed late in 1960. Chemical & Industrial Corp., 256 McCullough St., Cincinnati, O., has been awarded the construction contract reported to be in excess of $2 million.

Either it is RLM APPROVED or it is NOT!

The ONLY WAY to be SURE is to

SEE THE RLM LABEL!



There is NO SUCH THING as an RLM "TYPE" Fixture

According to the new, higher I.E.S. Recommended Industrial Lighting Levels, 80% of present industrial lighting is now obsolete. This makes RLM quality concepts of lighting equipment design, performance and maintenance features more important than ever.

You can't have quality lighting without quality lighting equipment!

There are those who claim a lighting unit to be "just as good" as an RLM-labeled unit. It may even LOOK like an RLM unit. But the only proof positive is the RLM Label itself — the only evidence that the unit is RLM approved.

Why there is NO SUCH THING as an RLM "Type"?

The RLM Label on fluorescent and incandescent lighting units, first of all, assures the buyer of design and construction that meet the RLM Institute's high standards of quality. However, he also receives a Warranty of Uniform Quality because of the Inspection System back of every RLM-labeled unit. This Inspection System assures the buyer that each and every fixture labeled will uniformly meet the quality RLM standards.

How RLM Checks Uniformity of Quality

RLM testing and inspection procedures require that representatives of the Electrical Testing Laboratories periodically visit plants of all RLM Member-manufacturers. They take lighting fixtures right off the assembly lines and out of stock for testing and inspection at their laboratories. They may also obtain test samples directly from the distributors' shelves or out of contractors' stocks on the job in order to check Uniform Quality at every level of distribution.

This activity of the RLM Standards Institute, which makes possible the Warranty of Uniform Quality, is not duplicated by any other agency in the lighting industry. That is why there is no such thing as an RLM "Type" Lighting Unit.

Uniform Quality as assured by the RLM Label does not mean that all RLM fixtures made by the various manufacturers are alike in quality. Quite the contrary, each manufacturer engineers into his RLM-labeled fixtures such other advancements in design and quality which he deems important to quality performance. Uniform Quality refers to the labeled fixtures delivered to the buyer by the manufacturer.

Uniform Quality Essential to Finest Performance

This quality uniformity in delivered fixtures is essential to uniformly satisfactory lighting equipment performance. It assures that each unit in the system performs with equal efficiency to the other . . . that ballasts function with uniform efficiency . . . that the reflection factor be uniform from unit to unit . . . that the units be of uniformly durable construction with the identical-gauge steel and the same thickness Porcelain Enamel. Such uniformity reduces to a minimum the plague of spotty performance by individual units in a lighting system.

R-526

Every RLM Unit Must Conform with High-Quality Standards such as these:

Porcelain Enamel Reflectors — all porcelain enamel RLM Units must have a specified thickness of Genuine Porcelain Enamel fused to steel. This unsurpassed high-reflection, high-diffusion reflecting surface is the only commercially available finish that cannot deteriorate or corrode. Simple soap-and-water cleaning quickly restores it to original efficiency.

High-Quality Ballasts — RLM Fluorescent Units must be equipped with Certified Ballasts which prevent high-temperature ballast operations, supply proper starting current, maintain proper operating watts to the lamp. Because of their high power factor, present wiring capacity can be utilized most efficiently.

Reflector Design — every RLM Unit must conform with the approved principles of Illuminating Engineering. Such design protects the workers' eyes while delivering, not only the most light per dollar, but also the required quality of light for the individual seeing task.

Sound Construction — RLM Units must comply with high fabrication and materials to insure standards of maximum resistance to sag, distortion and breakage.

FREE SPECIFICATIONS BOOKLET! FREE I.E.S. Industrial Lighting Recommendations!

These two publications are a must to anyone planning lighting or re-lighting projects of industrial plants and utilitarian locations. Contains all RLM Specifications. For a complimentary copy write: RLM Standards Institute, Inc., 326 W. Madison St., Suite 8315, Chicago 6, Ill.

RLM STANDARDS INSTITUTE

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Clean, Strong, Unified Threads from lot to lot!

Assure interchangeability with bolts and nuts that fit as they should—uniform from fastener to fastener, order to order.

Our quality controlled bolts and nuts meet exacting tolerances for proper fits and strong connections. Smooth-turning threads assemble easily yet snugly, and give maximum holding power.

Always insist on dependable Screw and Bolt Corporation of America high-quality fasteners.

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Formerly Pittsburgh Screw and Bolt Corporation

America's Most Complete Line of Industrial Fasteners

NEW BOOKS

for the plant engineer

Loss Prevention Guide

HANDBOOK OF INDUSTRIAL LOSS PREVENTION. Size 10 by 7½ in. approx; 864 pp; illustrated; cloth bound. Published by McGraw-Hill Book Company, Inc., 330 West 42nd St., New York 36, N.Y. Price $20.00.

THE FACTORY Mutual Engineering Division compiled the material found in this comprehensive handbook which is a good manual to keep handy in a plant. It presents modern fundamentals, procedures, and data for protecting plants and processes against destruction or damage by fire, explosion, lightning, wind and earthquake.

Titles of some of the 74 chapters in this master loss-prevention guide are as follows: fire resistance of building construction and materials; sprinkler system maintenance; carbon dioxide systems; electrical maintenance; industrial ovens and driers; liquefied petroleum gas; hydraulic fluids; flammable liquid pumping and piping systems; dust explosions; atomic energy; cooling towers; chimneys and stacks; and wind anchorage for cranes.

Tested equipment used by leading industries to prevent disastrous losses is described in this informative book which contains many engineering tables and diagrams.

Plumbing and Drainage

DESIGN OF PLUMBING AND DRAINAGE SYSTEMS by Louis Blendermann. Size 9¼ by 6¼ in.; 320 pp; illustrated; cloth bound. Published by the Industrial Press, 93 Worth St., New York 13, N.Y. Price $7.00.

AUTHOR of this book, which contains a good bit of information of interest to plant engineers, has plumbing design experience spanning more than 20 years. He has been engaged in engineering work for a number of major consulting engineering firms.

The nicely illustrated publication deals with such subjects as: footing drains around buildings; access space for plumbing fixtures; preventing sewage backflow in buildings; providing access for building traps; supports for hot water storage generators; expansion in hot water piping systems; sump installations; drinking water systems; and storm drainage system for flat roofs.

At the front portion of the book, there is a list of items that can be included in a survey form for plumbing alterations and additions. When many details are to be covered it is a good idea to work with a planned form as opposed to just taking notes. The book also includes entries for basic design data forms covering new projects. These pertain principally to the various building systems, i. e. sanitary, storm, sprinkler, vacuum and others.

Cranes

ELECTRIC CRANES by H. H. Broughton. Size 10 by 7¼ in. approx; 511 pp including index; illustrated; cloth bound. Available from E & F.N. Spon Ltd., 15 Bedford St., Strand, London, W.C.2. Price £7—10s. Net.

RE-WRITTEN and re-illustrated the third edition presents material considered likely to be most serviceable to readers. Particulars are given of recent authoritative structural, mechanical, and electrical investigations which affect design and operation. The book includes descriptions of various types of cranes.

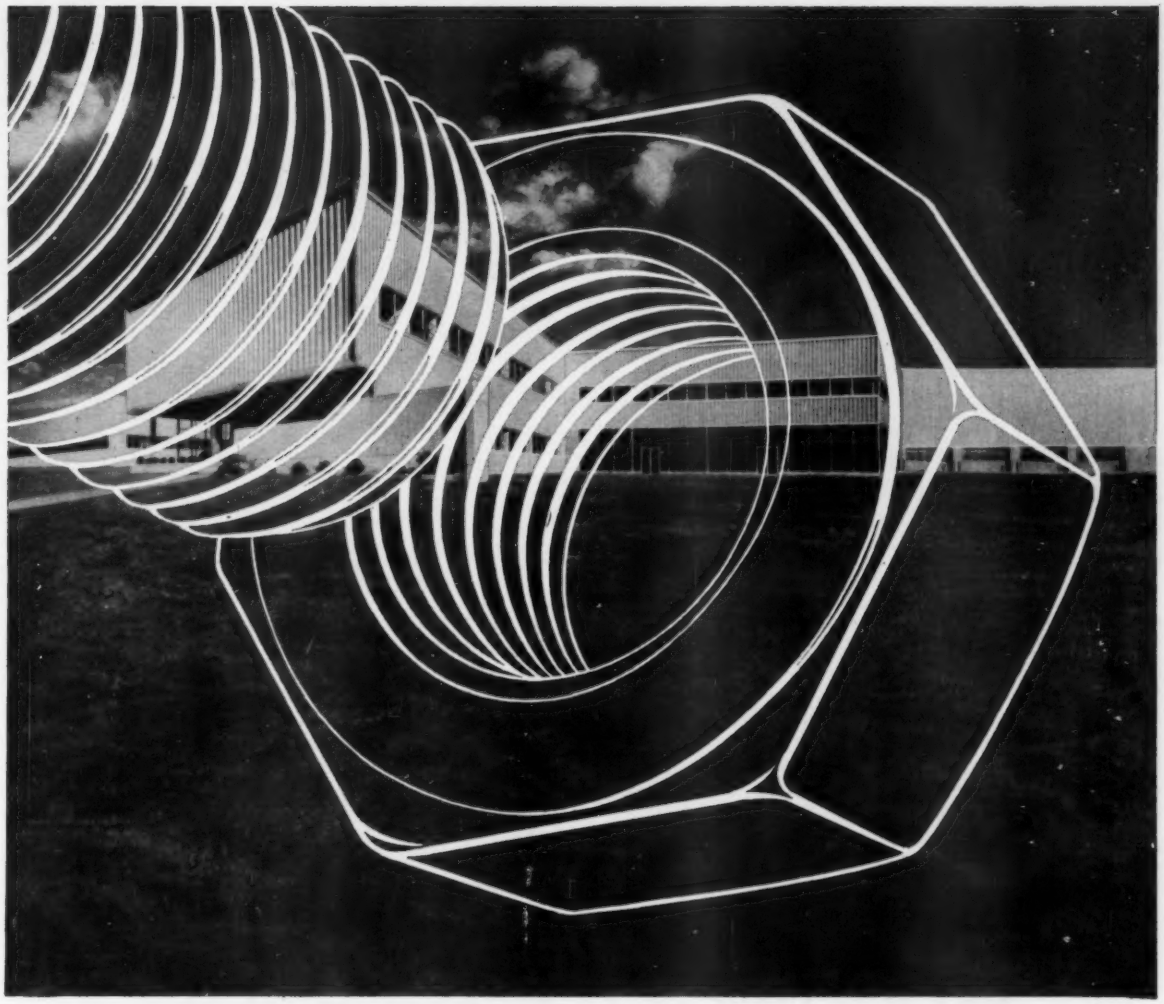
The following are some of the major topics discussed in this comprehensive work: framed structures; crane hooks; rope drums and sheaves; track rails, wheels and trucks; crane mechanisms; speed control and braking; variable voltage control; power required for driving; and spur and helical gearing.

Quality Control

STATISTICAL QUALITY CONTROL: An Introduction for Management by D. H. W. Allan. Size 7½ by 5⅛ in. approx; 129 pp including index; cloth bound. Published by Reinhold Publishing Corporation, Dept. B-283, 430 Park Avenue, New York 22, N.Y. Price $3.50.

IN THE FIRST chapter of the book, there is a brief treatment of each of the following: basic philosophy, history, and broad application of statistical quality control in addition to other comments. The discussion in the second section deals with the assessment of need for S.Q.C., development of a typical organization, economic considerations concerning product quality, use of quality control consultants, and a few other subjects.

The significances of median, mode, standard deviation σ and x are brought out under the chapter heading of Some Elementary Statistical Concepts. Other chapter topics in the book are as follows: process capabilities; statistical control charts; statistical acceptance sampling; methods for investigation and experimentation; and sources of quality control information.



A new name for a dependable old friend

On April 15, Pittsburgh Screw and Bolt shareholders voted to change their company's name to Screw and Bolt Corporation of America.

This new name clearly reflects our continuous expansion and diversification to service the ever increasing and rapidly changing needs of our customers. Today, with four major divisions and plants from Texas to Connecticut, our national scope of business has earned for us the reputation as producers of "America's most complete line of industrial fasteners."

In keeping with this progress, our new, fully integrated Pittsburgh plant, covering—under a single roof—an area equivalent in size to ten football fields . . . offers the utmost in operating efficiency. It is representative of the modern facilities and up-to-date production techniques that keep our quality tops and our service prompt.

We are happy to announce this name change to our many friends and look forward to serve you under our new banner . . . Screw and Bolt Corporation of America.

VMA 6710

SCREW AND BOLT CORPORATION OF AMERICA

SERVES THE NATION

Formerly Pittsburgh Screw and Bolt Corporation • P. O. Box 1708 Pittsburgh 30, Pennsylvania

DIVISIONS: Pittsburgh • Gary Screw and Bolt • Southington Hardware • American Equipment

AMERICA'S MOST COMPLETE LINE OF INDUSTRIAL FASTENERS

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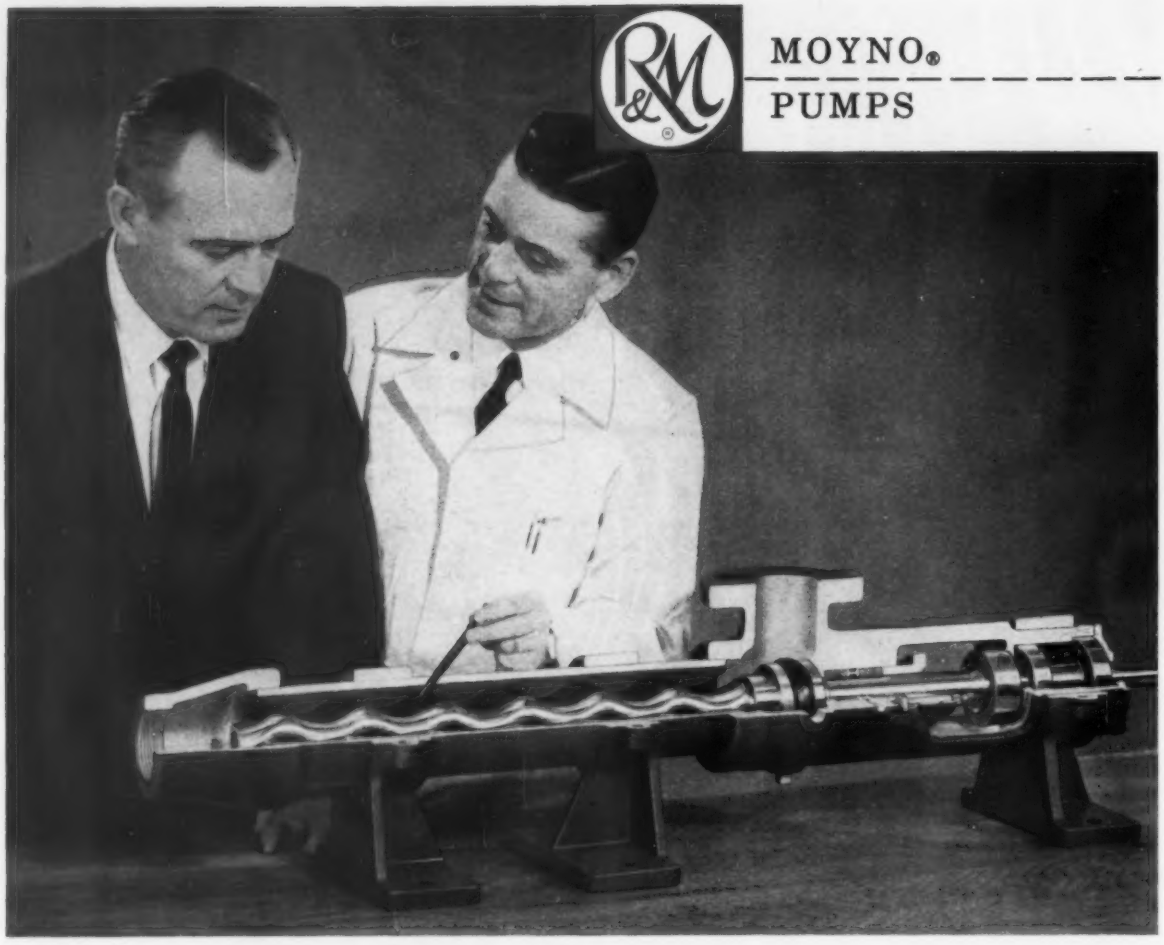

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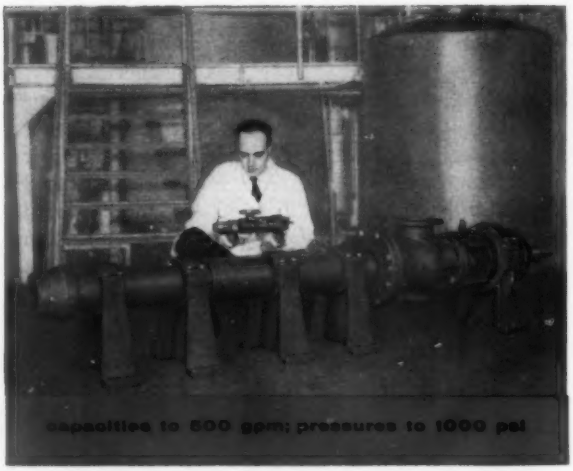
PUMPS

Let MOYNO'S® *"Progressing Cavities"* Cut your Pump Maintenance Costs!

MOYNO's unique *"progressing cavity"* principle cuts pump maintenance costs because material being moved contacts only one moving element. MOYNOS are constructed to stoutly resist corrosion and abrasion. As shown in the cutaway model above, MOYNO's screw-like rotor revolves in a double-threaded stator forming *"progressing cavities"* that move material smoothly along, without foaming, aerating or crushing. Even where duty is so torturous that rotor and stator must be made of special resistant materials, MOYNO parts show little wear.

In industry everywhere, and on OEM applications, MOYNOS are proving "if it can be pushed through a pipe . . . MOYNO will pump it!" Typical materials pumped include non-pourable pastes, abrasive slurries, chemicals, foods, acids, even suspended solids up to one inch in size. Many materials now successfully pumped by MOYNO were once considered "unpumpable" . . . had run up prohibitive maintenance costs on other type pumps or ruined them completely.

Capacities are available up to 500 gpm and pressures up to 1000 psi. Off-the-shelf replacement parts are always immediately available. No doubt your plant flowsheet or OEM product has a spot where MOYNOS can cut costs drastically. To find out how, write today for Bulletin 30-PE!



ROBBINS & MYERS, INC.

motors, household fans, Propellair industrial fans, hoists, Moyno industrial pumps

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BULLETINS

(Begins on page 21)

146 Rubber Parts, Products—Eight-pp Form 237C, in file folder form, describes company's facilities for producing custom-made rubber parts, seals and components. Facilities for developing natural, synthetic and silicone compounds, fabricating techniques and a showing of representative products and services provided. Goshen Rubber Co., Inc.

AIR CONDITIONING AND DUST CONTROL

147 Air Diffusion Equipment—Catalog 1-59 is a comprehensive 56-pp publication affording easy selection of air diffusion equipment. A feature is a color-key for indentification at-a-glance of four major product groups, covering wall and ceiling type supply grilles and registers; wall, ceiling and door type return grilles and registers; extruded aluminum grilles; and accessories such as volume extractors and plaster frames. Detailed selection tables and illustrations included. Waterloo Register Co., Inc.

148 Sprayed Coil Dehumidifiers—Bulletin 9427, 24 pp, describes draw-through and blow-through sprayed coil dehumidifiers for a variety of air conditioning applications. A section is devoted to principles of blow-through sprayed coil dehumidifiers. Also included are illustrations and descriptions of construction details, optional arrangements and related equipment. Typical specifications, a recommended procedure for sizing the unit and a discussion of three humidification methods provided. The Industrial Div., American-Standard.

149 Dust Control Unit—Featured in Bulletin V-100 is a conditioner unit for dust control, designed to apply rapid, on-the-spot conditioning to dust materials in all types of handling. Principles of operation are described in an accompanying engineering data bulletin, Bulletin V-101. The Johnson-March Corp.

150 Packaged Dust Collector—Twenty-pp Bulletin 272-B, on company's Type D Roto-Clone, provides information on its application, design, operation, installation and arrangements. Describes hoppers, precleaners, aftercleaners etc., including arrangements for trickle valve, dust doors, rotary locks and dust gates. Performance characteristics are charted. American Air Filter Co., Inc.

151 Electric Air Cleaner—Bulletin 258A, 16 pp, contains detailed information on electronic air cleaners which remove dust and smoke from the air by the use of the basic phenomena of electrostatic force. Explains electronic principle of operation, describes collector cell construction, covers design features. American Air Filter Co., Inc.

152 Flexible Hose—Advantages of flexible hose in air handling and fume control applications are detailed in 20-pp Bulletin 83. Material specifications and selection data are included and typical applications illustrated. The Flexaust Co.

HEATING

153 Electric Comfort Heating—Sixteen-pp Bulletin F-975C illustrates Chromalox electric comfort heaters, including convection, forced-air and radiant heaters that may be surface mounted, built into the wall or installed in a duct system. Wall mounted thermostats, both line and low voltage models, are also shown. Edwin L. Wiegand Co.

154 Instantaneous Heaters—Illustrated 24-pp Bulletin 304.4K1 presents instantaneous water heaters with extra-large steam inlet area. Seventeen pages of selection charts, tables, and piping diagrams are provided to assist in selection of units to meet various requirements. Industrial Div., American-Standard.

FIRE PROTECTION

155 Fire Fighting Equipment—This 28-pp brochure covers interior fire extinguishing systems, portable extinguishers, cabinets and other inside fire control products. Among the systems described are automatic sprinkler, carbon dioxide, dry chemical, foam and smoke detection. Details on hose and extinguisher cabinets are included. The Fyr-Fyter Co.

156 Fire Extinguishers—This 6-pp brochure describes portable fire extinguishers and accessories. Among the types described are carbon dioxide, dry chemical, soda-acid, foam, vaporizing liquid, pressurized water and anti-freeze extinguishers and wheeled engine units. American La-France Corp.

157 Fire Control Chart—This wall chart explains three classes of fires and describes approved portable extinguishers for each. Types of extinguishers described are water or anti-freeze, foam, dry chemical, carbon dioxide, vaporizing liquid, and loaded steam. Walter Kidde & Co., Inc.

WELDING, MACHINE SHOP AND METAL WORKING

158 Welding Equipment—Illustrated with cross-section drawings, this 24-pp bulletin evaluates design features found in oxy-acetylene welding and cutting equipment and industrial regulators. Comparative data on products of various manufacturers is charted for easy reference. Modern Engineering Co.

159 Machining Aluminum—This 32-pp booklet provides data on aluminum practices, tool angles and designs, and tool materials. Proper speeds, feeds, lubricants and cutting compounds are explained, and charts covering major machining operations —turning, milling, shaping and planing, drilling, reaming, tapping, others —are included. Reynolds Metals Co.

Reader Service Cards for ordering bulletins are on pages 235-236. Be sure to include your name, job title, and company even if you want bulletins mailed to your home address.

160 Precision Borizing—This 16-pp brochure shows how various operations can be combined on a unit-type Bore-Matic for automatic machining simultaneously or in sequence. Typical setups in the brochure show how 19 surfaces on nine holes are drilled, reamed, bored, counterbored and faced at one loading; how connecting rods and pistons are machined simultaneously. The Heald Machine Co.

161 Machine Tool Control—This comprehensive 32-pp publication explains the principles and applications of the Inductosyn, an automatic machine tool control system for micro positioning. Describes both linear and rotary types and contains photos of installations, describes various applications, and demonstrates versatility and adaptability of the system. Far rand Controls, Inc.

162 Tracer Control—Bulletin GEA-6122, 8 pp, describes tracer control systems for a wide variety of metal working applications, including vertical boring mills, skin milling machines, center-drive lathes, turret lathes, and contour profile milling machines. Shows how tracer controls work and how they are used as complete systems for machine operations. General Electric Co.

MATERIALS

163 Nylon Stock Shapes—Property advantages of a material used to expand the field of nylon in such applications as gears, rollers, bearings, washers, wear strips and pads and other applications requiring long wear life and exceptional resistance to creep or cold flow, are detailed in this product bulletin on nylon shapes. The Polymer Corp. of Pennsylvania.

164 Butyl Rubber Compounds—Resistance of butyl rubber to ozone is evaluated in 12-pp Bulletin 105-1. Tables of data show test results for both mold- and steam-cured compounds. A second study, Bulletin 102-1, demonstrates the resistance of butyl rubber to a number of commercial fire-resistant hydraulic fluids. Tables and graphs show effects of immersion temperature on volume swell and physical properties of butyl rubber. Thiokol Chemical Corp.

165 Glass Cloth—Five bulletins describing woven-glass-base insulating tapes and fabrics are available from the company. The bulletins describe properties and applications of glass tapes, fabric sheets, wrappers and die cut pieces, both silicone-varnished and rubber-coated. Each bulletin includes, in tabular form, information on physical and electrical properties. Continental Diamond Fibre Corp.

BULLETINS

(Begins on page 21)

166 Silicone Rubber—Room temperature vulcanizing silicone rubber, recommended for electrical potting and encap-sulating, for flexible mold-making materials, and for high and low temperature sealing and caulking, is described in 8-pp Bulletin CDS 170. Includes complete product and application data for three RTV compounds. Silocone Products Dept., General Electric Co.

OTHER EQUIPMENT

167 Solving Corrosion Problems—This 24-pp booklet explains how company's duplex tubes help solve corrosion problems in condenser and heat exchange equipment. These bimetal tubes are designed to provide maximum corrosion resistance in condensers and heat exchangers where two corrosive media are in process. Booklet gives data on heat transfer efficiencies, design and installation. Includes check list of applications indicating metal combinations which best resist attack from common corrosive media. Bridgeport Brass Co.

168 Coating Structural Steel—These four recommendation bulletins were created to aid in preparing specifications for coating steel surfaces. Bulletins cover: specifications for coating galvanized iron surfaces, coating steel water tanks, coating metal window sash, and coating structural steel. Rust-Oleum Corp.

169 Aluminum for Heat Exchangers—Advantages of aluminum in heat-exchanger fabrications are described in this 16-pp bulletin. Text covers aluminum heat transfer rates, temperature properties, tensile strengths, pressures and dimensional tolerances. Charts provide information on aluminum stress values, working pressures, thermal expansion and conductivity and friction factors. Reynolds Metals Co.

170 Automatic Air Products—Featured in 22-pp Bulletin 157 are automatic air products, including separators, afterdriers, filterators, filters, line drains, governors and kits, combinations, regulators, and lubricators. Advantages are detailed and operation described, and specifications tabulated. Wilkerson Corp.

171 Internal Pipe Insulation—A technique for reducing installation cost of lines and vessels carrying hot gases under pressure is detailed in this 6-pp bulletin. Shows how Insidline, an internal insulation, separates effects of temperature and pressure, making it possible for normal wall thicknesses of carbon steel piping to carry gases up to 2000 F. Discusses conditions under which Insidline is economically advantageous. Baldwin-Hill Co.

172 For Water Waste Treatment—Catalog 952 contains 64 pp of comprehensive information on water and bar screens, grinders, collectors, settling tanks, scum removers, controlled flocculation, feeders, conveyors, bucket elevators, chains and sprockets for water, sewage and industrial waste treatment. Drawings, charts and installation photos supplement the copy. The Jeffrey Mfg. Co.

173 Polyethylene Corona Effects—A study of effects of corona on polyethylene is presented in this 28-pp research booklet, designed to remove some of the mysteries confronting plant engineers concerned with wire and cable insulated with polyethylene. The report is based on 200,000 sample exposure hours. E. I. Du Pont De Nemours & Co., Inc.

174 Why Automatic Assembly?—Twelve-pp Bulletin 601 presents means of justifying automatic assembly when economic feasibility is doubtful due to low production rates or requirements. Methods of tooling machines with slow cyclic rates to produce multiple assemblies simultaneously and the design of equipment adaptable for production of different, but basically similar items are featured. Ferguson Machine Corp.

175 Induced Draft Fans—Bulletin L-3, 16 pp, describes advantages of company's induced draft fans and illustrates unique features. Dimensioned drawings and charts are presented, also instructions covering ordering procedures. Schematic diagrams of installations included. Lehigh Fan & Blower Div., Fuller Co.

176 Rolled Tooling Plate—Described in this 8-pp bulletin is company's rolled tooling plate used to make industrial tools, jigs and fixtures. Advantages are detailed and specifications and design data included. Kaiser Aluminum & Chemical Sales, Inc.

177 Hot Water Boilers—Eight-pp Bulletin 1251 describes hot water boilers designed for forced circulation hot water systems for commercial and industrial space heating. Curves, tables, charts and photos amplify text. Orr & Sembower, Inc.

178 LMTD Chart—The chore of finding the logarithmic mean temperature difference—is simplified with this easy-to-use LMTD chart. It consists of three columns. You simply connect initial temperature difference with the final difference and note the intersection of this line with the middle column, which gives the LMTD. Dean Thermo-Panel Coil Div., Dean Products, Inc.

179 On Plant Security—Advantages of plant security service rendered by this detective and protective agency are detailed in this 16-pp bulletin. Thumbnails major areas of plant security work, such as prevention of in-plant thievery, fires and damage to property, maintenance of general safety, enforcement of company rules, management of traffic and parking, better public relations. Pinkerton's National Detective Agency, Inc.

180 Calculating Machine—Featured in this 16-pp booklet is a tiny calculating machine with all four arithmetic operations. It can be held in one hand while being operated. Details on design and operation are given. Julian Benjamin.

181 Tube Form Mountings—This 12-pp product bulletin describes tube form mountings and Dynaflex joints, specially engineered for vibration and shock control. Contains an application guide, performance characteristics and data, detailed specifications, typical applications, and methods of installation. Lord Mfg. Co.

You'll save time in ordering bulletins by using the Reader Service Cards on page 236. Of course we honor letterhead requests—but it takes us somewhat longer to handle them.

182 Zip-Tape—Featured in this 8-pp illustrated booklet is Zip-Tape—a cellophane package opening tape. Booklet includes basic tips on working with Zip-Tape on and off packaging machinery. Another booklet, "Heard About the Easy Way?" contains additional information, and sample spools of the material. The Dobeckmun Co., Div., The Dow Chemical Co.

183 Magnetic Separator—A high-intensity magnetic separator of the induced roll type is described in Bulletin 2091. Supplemented by specification sheets, bulletin shows typical installations, explains principles of operation and suggests applications. Stearns Magnetic Products.

184 Industrial Automation—This product information folder contains descriptions and specifications on a wide variety of "building-block" type automation machines for mechanizing and integrating production and assembly operations. These include floor feeders and orientors, rotary hoppers, self-compensating grinder controls, high speed automatic hardness testers and electronic inspection systems for multiple gaging and selective segregation of parts. Radio Corp. of America.

185 Dialysis System—Of interest to plant engineers concerned with use of acid in processing is the Hi-Sep dialysis system described in Bulletin WC-121. Covers design, operation, applications and advantages of the dialyzer. Engineering drawings show construction and operation. Also discusses reasons why system provides high-rate separation and large-tonnage recovery. Graver Water Conditioning Co.

186 Industrial Nozzles—Catalog 59 contains 32-pp of listings and data on nozzles for industrial spraying applications. Specific data on spray angles, dimensions, types of connections, and capacity vs pressure for all standard nozzles are presented in simplified tables. Wm. Steinen Mfg. Co.

The Power Plant Engineer Said:
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DATA FILE of literature for the plant engineer's library

STANDARD CATALOGS, bulletins and handbooks are listed to help plant engineers maintain a permanent data file. To get these free catalogs, circle item numbers of those wanted on postage-free cards provided on pages 235-236.

ELECTRICAL

301 Drip-Proof Motors — Bulletin 857 contains 12 pp of detailed information on company's line of open drip proof and totally enclosed fan cooled motors. Construction features are described and tables of engineering data and specifications included. Brook Motor Corp.

302 Motor Protectors — Questions and answers about company's built-in, three-phase motor protectors are designed to describe features and advantages of these control units. Typical applications are illustrated. Metals & Controls Corp.

303 Motor Control Centers—Maximum protection motor control centers with circuit isolation are described in this 32-pp technical design data book. Advantages and features are detailed and technical data required to engineer and specify the motor control centers are included in special fold-out sections which include specifications. Northeastern Engineering, Inc.

304 High Voltage Control—This 16-pp booklet discusses general features of company's high voltage control equipment. Details individual characteristics of both full and reduced voltage types of high voltage control for squirrel cage, synchronous and wound rotor motors. Ratings, dimensions, optional features listed. Cutler-Hammer Inc.

305 Circuit Breakers — Bulletin 5042-A deals with company's current limiting circuit breakers on low voltage systems, operational characteristic curves and ratings. A three-dimensional sectional view opens up to show internal construction details. I-T-E Circuit Breaker Co.

306 Protective Relays—Featured in 16-pp Catalog 5-020 are time delay overcurrent relays, directional inverse time overcurrent relays, differential relays, instantaneous overcurrent relays (adjustable setting), inverse time voltage relays, auxiliary relays, ac-dc definite time relays, and reclosing relays. For each model, tabular data and photos cover its applications. Federal Pacific Electric Co.

307 Commutator Maintenance—This commutator and slip ring maintenance data file contains information on methods and procedures for more efficient commutation. Individual bulletins cover brushes, sparking, picking, dragging and other troubles, maintenance tools and how to use them. Ideal Industries, Inc.

308 Distribution Equipment — Detailed information on company's line of electrical distribution equipment is presented in 82-pp '59 Marketeer, Catalog M-159. Among equipment described are Electrostrip multi-outlet assemblies, switches, lighting panelboards, power panelboards, switchgear assemblies, and various types of electrical duct. Tables of essential data. BullDog Electric Products Co., Div. I-T-E Circuit Breaker Co.

309 Portable Distribution System —Described in this 30-pp catalog is a portable distribution system for electric lighting and power, including such applications as portable lighting, heating and ventilation equipment, welding machines, power tools, and lighting transformers. System diagrams showing how each unit fits are included. Whitney Blake Co.

310 Electrical Equipment Digest—Electrical equipment illustrated and described in 160-pp Catalog Digest 142, includes load centers, circuit breakers, low voltage control, fusible service equipment and accessories, meter sockets and troughs, safety switches, panelboards, duct and fittings, starters. Square D Co.

311 Electrical Equipment—Condensed Catalog No. 5 contains 48 pp of descriptive data on company's line of electrical products, including conduit bodies, conduit fittings, connectors, ground fittings and EMT fittings. Dimensional data and features are shown. Gedney Electric Co.

312 Protective Equipment Guide—Form SPD is a 24-pp handbook on selection of protective devices for electric circuits, motors, appliances and apparatus, and is based on 1956 National Electrical Code. Besides providing suggestions on how to select right kind of protection, booklet provides wiring diagrams, motor tables. Bussmann Mfg. Co.

313 Insulated Cable — "How to choose insulated cable" is the subject of humorously illustrated 22-pp Bulletin 1117. Basic considerations to keep in mind when selecting insulated cable are stressed, and essential facts about construction components are presented. The Okonite Co.

314 Portable Electrical Cable—Detailed information on portable electrical cable for a variety of industrial applications is presented in this condensed catalog. Basic construction is detailed. Western Insulated Wire Co.

315 Armored Cable — Advantages, characteristics and construction of interlocked armored cable are detailed in this product bulletin. Types of insulation are described and illustrated. General Cable Corp.

316 For High Voltage Cable—Test results and service records on an improved butyl rubber compound for high-voltage cables are announced in 12-pp Bulletin EB-27. Covers resistance to ozone, operating temperature, high-voltage, dielectric strength, aging, insulating resistance, absorption. Anaconda Wire & Cable Co.

317 Wire and Cables—Bulletin RCP 100 is a 6-pp guide to electrical wire, cable and conduit manufactured by the company. Includes descriptive details on bare and weatherproof wire, magnet wire, building wire, service cables, machine tool and control wire, hook-up wires, power cables, portable cords, and conduit. Rome Cable Corp.

318 Cable Troughs — This 12-pp catalog offers a simple solution to any design problem of change of direction or elevation with a complete set of standard fittings, horizontal elbows, inside and outside vertical elbows, ties, crosses, covers and many special devices. The Globe Co.

319 Flexible Electric Conduit—Performance and application data on company's line of flexible plastic covered electrical conduit, liquatite, are featured in this illustrated brochure. Specifications and ordering data. Electri-Flex Co.

320 Switch Wiring Diagrams—Bulletin 709 is a 36-pp booklet of typical wiring diagrams for across-the-line starting switches. Indexed and arranged for easy use, this booklet serves as a guide to some of the many ways in which this company's manual and magnetic across-the-line starters are used. Allen-Bradley Co.

321 Wiring Devices — Catalog 60, about 80 pp, presents ordering data on wiring devices including a wide range of switches, convenience outlets, lampholders, fluorescent devices, cord connectors, adapters, wall plates, accessories etc. Fully illustrated with photos, catalog provides condensed information on features, dimensions, applications. Pass & Seymour, Inc.

322 Fuses for All Uses—This revised edition of manufacturer's complete line, Folder 3, includes illustrations and descriptions of fuses for every purpose. Features dual-element cartridge fuses for time-lag in protection against overloads, and delay renewable fuses and renewal links. Economy Fuse & Mfg. Co.

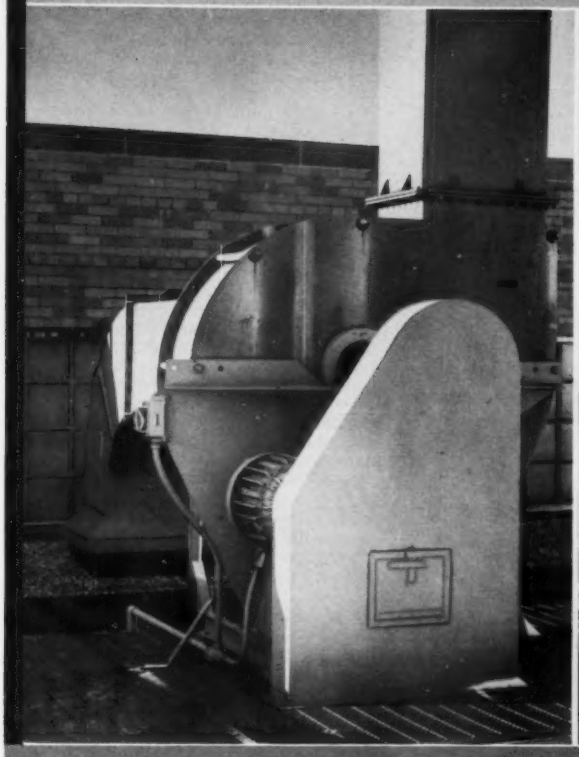
323 For the Missile Field—Designing, testing and manufacturing facilities for producing electrical equipment used by the missile industry are featured in 8-pp Bulletin 2707. Condulet electrical equipment and floodlights are described. Crouse-Hinds Co.

324 Control Batteries—Bulletin CP-540 describes features and advantages of a line of batteries for control, switchgear and auxiliary power. Engineering details and specifications are tabulated. C & D Batteries, Inc.

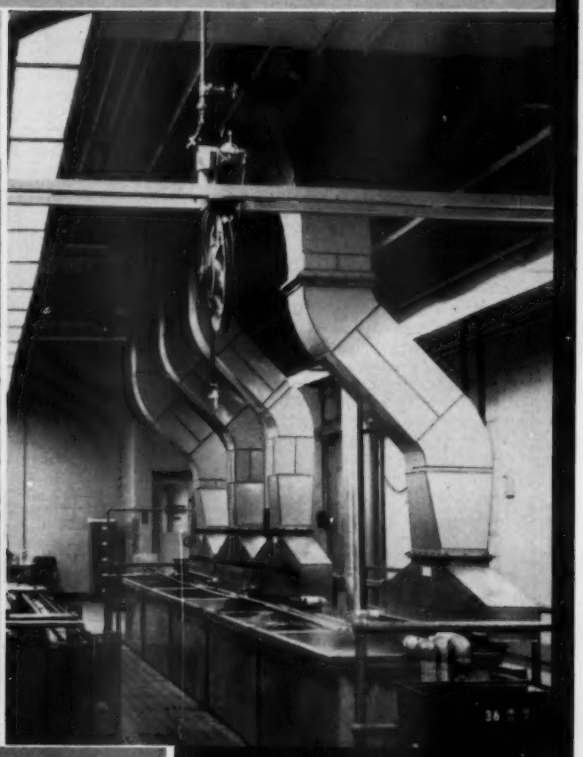
325 Battery Users Manual—Motive-power battery maintenance and repair is detailed in this newly revised edition of company's Battery Users

Industrial Plastic Fabricators, Inc. reports . . .

Lightweight Boltaron 6200 roof installations require far less structural support.



Complete Boltaron 6200 installation... ducts, tanks, hoods, blowers.



Boltaron® 6200

handles chemical & industrial fumes at *Western Electric

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Boltaron® 6200 IS BEST BECAUSE:

- Protects against most corrosive fumes and liquids in any combination.
- Resists build-up of residual materials from corrosive fumes and liquids.
- Solid Boltaron has no coatings to peel or chip —does not require recoating or repainting.
- Chemically inert.
- Non-toxic, imparts no taste or odor.
- Can be welded, bolted, threaded, milled, ground, buffed and polished.
- Non-sparking—will not support combustion —handles fumes and liquids.
- High dielectric strength.
- Extremely lightweight—non-porous—and smooth surface.
- Tensile strength is 8000 psi.
- Can be joined by heat welding, solvent cementing, and threading.

IPF systems fabricated from Boltaron 6200 are being used across the country by many progressive manufacturers to solve a wide variety of industrial problems, especially where corrosive fumes and liquids have been extremely costly to handle. Performance proves Boltaron 6200 systems help decrease operating costs—increased operating efficiency.

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GENERAL® PLASTICS
The General Tire & Rubber Company

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For more facts circle 659 on Reply Card

DATA FILE

(Begins on page 240)

Manual (Bulletin GB-1599A), 44 pp. Developed as a result of in-plant training courses, this book is designed to enable plant engineers to conduct an organized battery training course. Gould-National Batteries, Inc.

LIGHTING, COMMUNICATION

326 **Architectural Floodlighting** — Eight-pp Bulletin GEA-6437 illustrates various methods of floodlighting industrial plants, public and commercial buildings and others. Provides information on general purpose models. General Electric Co.

327 **Incandescent Lighting**—The 24-pp "Incandescent Lighting Guide Book" features sections on the general advantages of incandescent lighting, the history of incandescent lamp developments, and includes chapter on basic types, bulb shapes, sizes, glass types and finishes, and bases. Sylvania Electric Products Inc.

328 **Illumination Design Data**—Basic reference data on interior lighting installations is contained in 48-pp Manual A-4854, which features a section describing footcandle levels required for each group of seeing tasks. These footcandle levels are then related to many kinds of rooms and areas. Westinghouse Electric Corp.

329 **Lighting Fixtures**—This 12-pp condensed catalog gives a compact presentation of company's fluorescent and Brascolite incandescent luminaries. Data on surface and pendant mounted units, recessed luminaries, and Gratelite electric ceilings provided. Edwin F. Guth Co.

330 **Lighting Standards**—The 1959 Edition of the RLM Standard Specifications Book, a reference guide for industrial lighting units, has been strengthened in the areas of efficiency, design and construction quality. New specifications are also included covering two- and three-lamp special service fluorescent units, three types of units utilizing 800 ma fluorescent lamps, new incandescent reflector sizes, and mounting specifications. RLM Standards Institute.

331 **Signal Equipment** — Tips on how to select suitable signals for any specific operations are offered in Bulletin 100. Describes horns, bells, warning lights, other signal equipment. Specifications, photos, wiring diagrams, dimensions, audibility rating charts, electrical characteristics. Federal Sign & Signal Corp.

332 **Signal Log**—Featured in this 44-pp "signal log" is a line of signal systems and devices, including fire alarms and warning systems, burglar alarms, thermostatic controls, intercoms, annunciators, buzzers, door openers, and clock and call combinations. Advantages for industry are detailed. Edwards Co., Inc.

HEATERS, HEATING

334 **Heating and Ventilating**—Company's "comfort curtain" principle of heating and ventilating is described in this 8-pp bulletin. Advantages are detailed and typical installations pictured through drawings and photos. Lennox Industries Inc.

335 **Direct Fired Heaters** — Complete description and specifications on unit heaters, duct furnaces and heavy duty heaters are presented in 12-pp Bulletin A1-1.2b. Cutaway views and construction features are included. Reznor Mfg. Co.

336 **Electric Heating**—Bulletin 975A, 12 pp, outlines advantages of electric heating and describes a number of different methods, such as radiant, convection, radiant and convection and forced hot air. Commercial and industrial applications are pictured, and specification and dimensional data included. Edwin L. Wiegand Co.

337 **Plate Coil**—A plate coil heat exchange surface that takes the place of pipe coils in industrial heating and cooling processes is described in this product bulletin. Technical data tables are included, in addition to price lists. Dean Thermo-Panel Coil Div., Dean Products, Inc.

INSULATION

338 **For Insulation Protection**—Provided in this comprehensive loose-leaf manual is technical information covering practically every requirement for insulation protection. An aid to proper adaptation and application of mastics, flashing compounds, adhesives and surface coatings, this book presents information classified as to industry usage, as power, process, cold storage. Book is available to qualified plant engineers. Benjamin Foster Co.

339 **Acoustical Insulation**—Described in this product bulletin is a fiber glass insulation designed for keeping duct systems quiet. Advantages are detailed and installation methods illustrated. Pittsburgh Plate Glass Co.

340 **Insulation Coating**—This 32-pp illustrated handbook, Form L-17, presents the advantages of company's No-Drip insulation coating for preventing condensation drip from metal, concrete, brick, wood, plaster, or composition surfaces. Lists applications. J. W. Mortell Co.

PUMPS, COMPRESSORS

341 **Continuous Flow Pump**—Bulletin 30-C, 8 pp, outlines advantages of company's Moyno pumps which handle a variety of materials—from free-flowing liquids to non-pourable pastes, abrasives, solids. Describes principle of operation, discusses performance, construction, capacities, specifications. Robbins & Myers, Inc.

342 **End Suction Pumps**—Described in Bulletin 158 are horizontal shaft, single stage, and suction pumps designed for handling abrasive mixtures and slurries, as well as corrosive and hot liquids. Various models in the line are described as to design and application. Nagle Pumps, Inc.

343 **Rotary Pumps**—The positive displacement principle upon which these rotary pumps operate is illustrated and described in this 34-pp bulletin. Discusses rotary pump fundamentals and includes detailed engineering data and selection tables. Viking Pump Co.

344 **Single Suction Pumps** — Ball bearing single suction pumps are illustrated and described in 24-pp Bulletin 976-G. General data and specifications are included, as well as rating tables, outline dimensions, sectional reference drawings. Buffalo Pumps, Div. Buffalo Forge Co.

345 **Condensation Pumps**—Eight-pp Bulletin 1403 describes company's line of condensation pumps for use in low and medium pressure-heating systems and steam-process equipment. Photos, drawings and other technical data on capacities and dimensions pertaining to construction, application and installation are included. Dunham-Bush, Inc.

346 **Air Compressors**—Eight-pp Bulletin 350 describes features and advantages of a line of water cooled, single stage, heavy duty air compressors. Cutaway view shows component features and tables list sizes, capacities and ratings. Pennsylvania Pump and Compressor Co.

347 **Air Compression for Industry** —This is a 24-pp combination data book and catalog on all types of air compressors from ⅓ hp to 20 hp. Discusses factors to be considered in the use of air for each operation, and points out importance of determining how much usuable air is needed. The Wayne Pump Co.

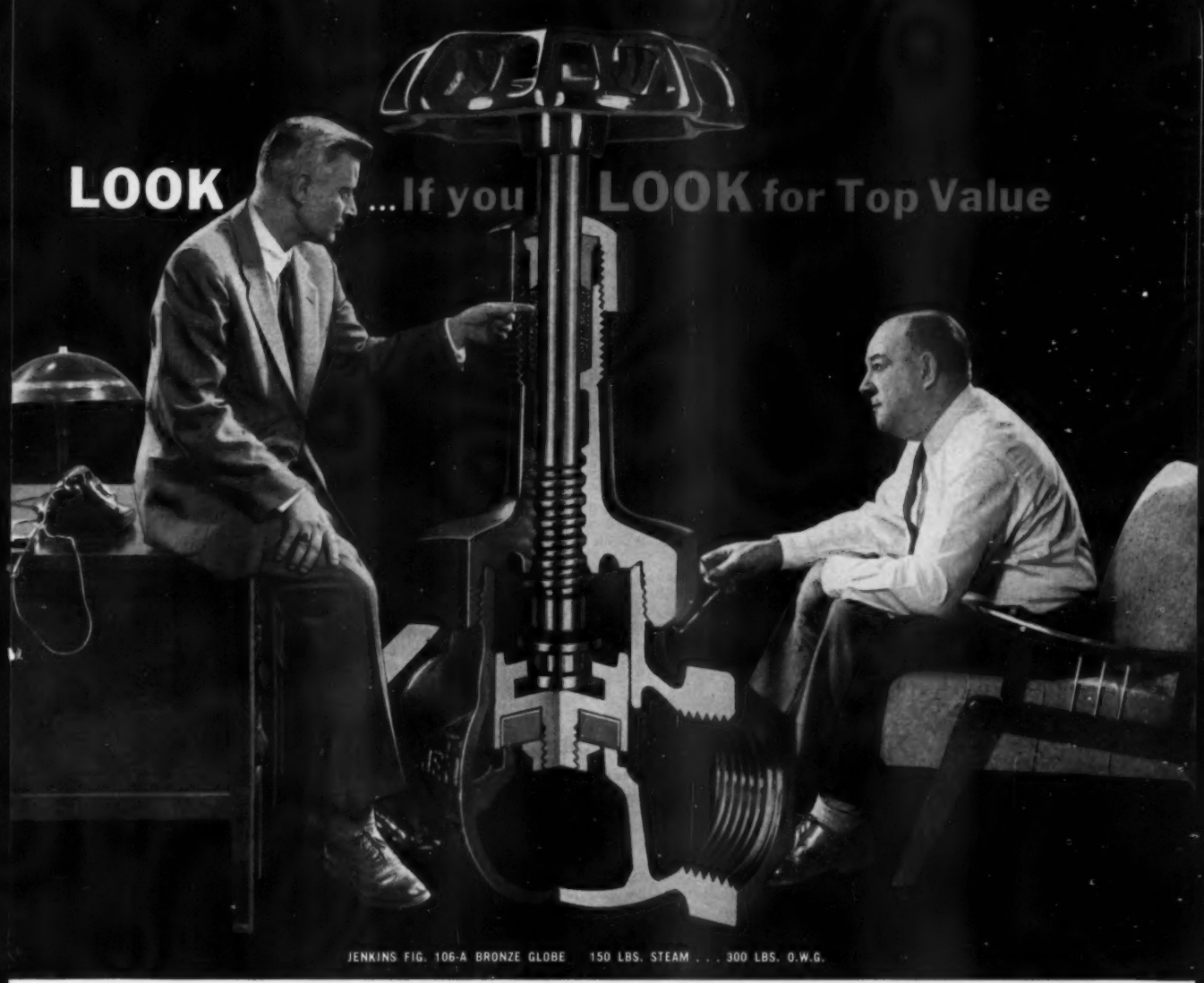
348 **Air Compressors**—Featured in this Product Bulletin CAS-18 are air compressors designed for a variety of industrial applications, including tank or base mounted units, simple compressors, single and two-stage, air cooled, electric or gasoline driven, ¼ to 50 hp. Curtis Mfg. Co.

349 **Oil-Free Compressors**—Heavy-duty industrial oil-free compressors are featured in 12-pp Bulletin A-44. Component parts are illustrated and described, and internal construction is shown on cutaway. Joy Mfg. Co.

350 **Stationary Compressors**—Sixteen-pp Catalog 5910 describes features and advantages of a line of stationary air compressors designed for a variety of industrial needs. Tables of weights, code words, and dimensions are included, as well as schematic diagrams, cutaway views showing design details, and other data. Schramm, Inc.

BOILERS AND GENERATORS

351 **Self-Contained Boilers**—Bulletin AD-162, 8 pp, describes company's complete line of self-contained



JENKINS FIG. 106-A BRONZE GLOBE 150 LBS. STEAM . . . 300 LBS. O.W.G.

in Disc Equipped Bronze Valves

LOOK at that Wheel — Tough malleable iron. Design unequalled for cool, sure grip.

LOOK at the Index Plate — Has Fig. No. etched in green background. Held by wheel nut which is secured by rolled-over spindle end.

LOOK at that Spindle — Made of high tensile bronze. See how much heavier it is . . . how many more deeply cut threads engage bonnet. And, the crowned head that reduces friction on disc holder. Sure, it costs more to make a spindle this way. But it reduces wear, preserves packing, means easier operation.

LOOK at the Packing Nut and Gland—Note the heavy and deep bronze hex. And, that bronze gland designed to compress packing toward spindle.

LOOK at that Packing Box — Its depth equals 1½ times spindle diameter. More packing space means less repacking. An asbestos, lubricated and graphited packing is used.

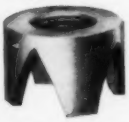
LOOK at that Bonnet — One-piece, screw-over design with big hex surfaces is easy to remove. Take an extra look at the bevel joint between bonnet and body, serving as an internal brace against the crushing effect of the bonnet assembly. Millions of Fig. 106-A in use for years prove this unique design licks distortion and springing.

LOOK at the Disc Holder — It's the Slip-on Stay-on type originated by Jenkins. Correct protective depth prevents flaking or cracking of disc.

LOOK at the Disc — Easily renewed without removing valve from line. Made of compositions to suit various services . . . and **made by Jenkins,** the only maker of both valves and discs.

LOOK at that Body — Just compare wall thickness of this high tensile bronze body with any other valve. The factor of safety is many times higher than rating requires. See the curved diaphragm to protect seat from distortion by pipe strain. Note that the raised seat is higher to permit more reseating operations . . . and wider, so it won't cut into disc. Pipe threads are full length and clean cut.

LOOK at this . . . for Throttling



—Just replace the standard disc nut with this Throttling Nut and a Fig. 106-A becomes well-suited to throttling service. This unique nut reduces the effects of wire drawing and its long legs restrict flow for accurate control. Many plants take advantage of this versatile valve to reduce valve and parts inventory.

THE FIRST renewable composition disc valve was a Jenkins Valve, originated nearly a century ago. Compare today's Fig. 106-A Bronze Globe with any other. See why so many valve users agree that a *Jenkins* is still the FIRST for top value. For descriptive folder No. 189-B on the full line of Jenkins Bronze Globe, Angle and Check Valves write to Jenkins Bros., 100 Park Avenue, New York 17.

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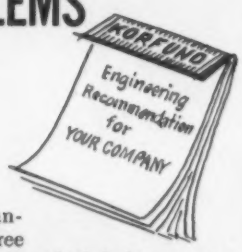

Take advantage of this free Korfund service which helps you stop costly vibration damage now. Machines which cause any vibration, shock or noise also cause damage to the structure, nearby delicate apparatus, personnel, and shorten the useful life of the machine itself. Just fill in the coupon below and mail to Korfund today. You'll receive a diagnosis and complete specifications with cost estimate tailor-made to answer your specific needs.

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DATA FILE

(Begins on page 240)

boilers for heating and processing steam or hot water. Design features and advantages are also covered. Cleaver-Brooks Co.

352 Hot Water Boilers — Catalog HCC-2, 20 pp, describes and illustrates design, construction, advantages and economics of company's controlled circulation hot water boiler for supplying high pressure, high temperature water for heating systems and process applications. Combustion Engineering, Inc.

353 Generators, Auxiliaries—Twenty-pp Catalog SB 60, on steam generators and allied equipment, provides cross section views of major products to show design and construction. Standard and special boilers are included, also burners, stokers. Erie City Iron Works.

354 Scotch Marine Boilers—Featured in Bulletin B-3333 is a line of Scotch Marine Boilers designed to meet exacting mechanical and thermal specifications. Mechanical and thermal features are detailed and specifications tabulated. The Titusville Iron Works Co.

PACKING AND SEALS

355 Too Hot to Handle?—Described in illustrated Catalog 480 is a circulating seal designed to reduce temperature of liquid in stuffing box. Cutaway view and diagram illustrate design and construction features of the circulating ring which provides circulation of liquids to maintain temperatures. Durametallic Corp.

356 Teflon Products—Three bulletins present this company's Teflon packings, gaskets, special parts and stock. Bulletin CP552 describes Chempro lines of Teflon ring packing, Teflon impregnated asbestos packing, V-type packing and Teflon seal cage —for use with acids and strong chemicals. Bulletin CP553 covers Teflon jacket gaskets, solid ring gaskets, expansion joints and special gaskets. Bulletin CP554 illustrates special parts available. Chemical & Power Products, Inc.

MECHANICAL POWER TRANSMISSION

357 Transmission Belting—Application information on company's line of transmission belting is presented in 16-pp Bulletin S-5174. Specific types of belting for a variety of applications is illustrated and described, and technical data tables, and a selection table for drives included. The Goodyear Tire & Rubber Co.

358 Motorized Gear Drive—Bulletin 2350 describes Line-A-Spede motorized gear drives which are gear reducers powered by standard NEMA frame motors mounted on a shelf attached to the reducer. Illustrates construction features through cutaway view, and includes engineering specifications and dimensions. The Louis Allis Co.

359 Fluid Drive—Eight-pp Bulletin 9813 describes and illustrates adjustable speed Gyrol fluid drives, 1- through 25-hop, giving advantages and applications. Components and operation are covered in detail and selection tables given. Industrial Div., American-Standard.

360 Packaged Speed Control—Bulletin 20,000, 8 pp, describes a line of packaged speed control drives which incorporate power conversion equipment for converting a-c to d-c power. Advantages are detailed and component features described. The Clark Controller Co.

361 Anti-Friction Bearings—Catalog 424-B, entitled "The broadest line in the anti-friction field," an 8-pp folder giving capsule presentation of company's entire product line. A brief description of each product is provided. SKF Industries, Inc.

362 Flexible Couplings—Condensed Engineering Catalog 51-A contains excellent data on the choice and use of company's flexible metal couplings for power transmission. Tells advantages of these couplings. Thomas Flexible Coupling Co.

363 Coupling Data—An integrated selection of product bulletins and data on company's line of couplings for a variety of industrial applications

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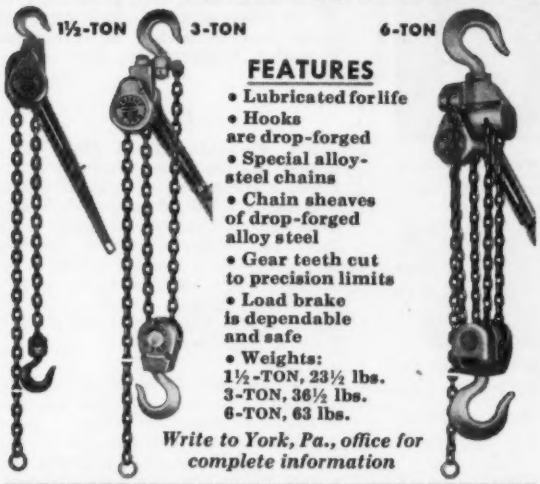

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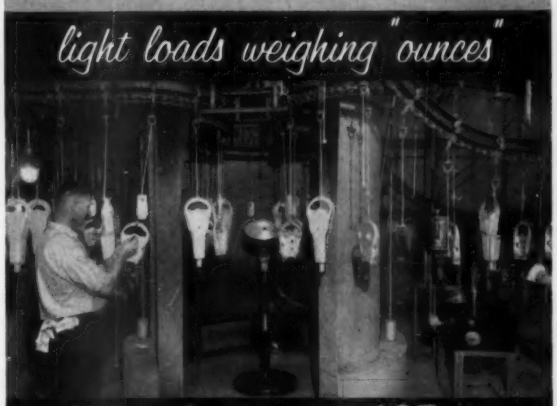
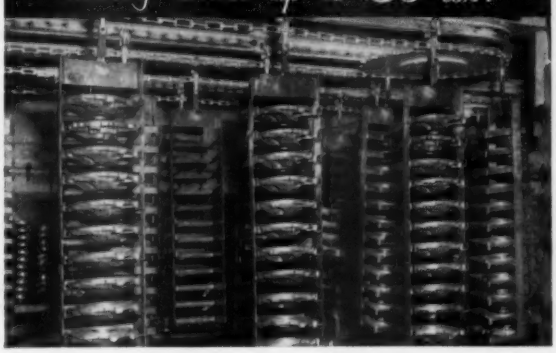


heavy loads up to 135 lbs.



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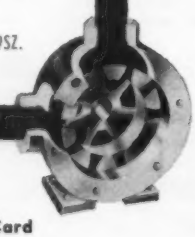

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DATA FILE

(Begins on page 240)

is presented in this handy ring-bound notebook. The notebook contains sections on product literature, engineering data, instruction sheets, application data, and price lists. To all of these sections, additional material can be added as it becomes available. Koppers Co., Inc.

HOSE

364 Flexible Metal Hose—Contained in this 36-pp bulletin is detailed information on characteristics and applications of company's flexible metal hose designed to serve a variety of industrial needs. Includes specifications, list of applications, and photos of the various types of hose available. Typical installations pictured. Pennsylvania Flexible Metallic Tubing Co., Inc.

365 Flexible Metal Hose—Detailed instruction on how to install all types of flexible metal hose properly, in order to secure the longest service are given in Bulletin N14A. Eight diagrams explain correct use of flexible connections to compensate for misalignment, and to eliminate vibration transmission. The Korfund Co., Inc.

366 Industrial Hose—Bulletin IH-10 features application and selection data on industrial hose, including braided, horizontal braided, wire braided, wrapped and braided, wire woven, smooth bore and rough bore. Descriptions of each type of hose are followed with application information. The Gates Rubber Co.

367 Industrial Teflon Hose—Bulletin 2140 describes advantages of Teflon and its applications in a variety of industries where resistance to temperature, pressure, corrosion and contamination is desired. Teflon hose specifications are included, as well as assembly procedure. Titeflex, Inc.

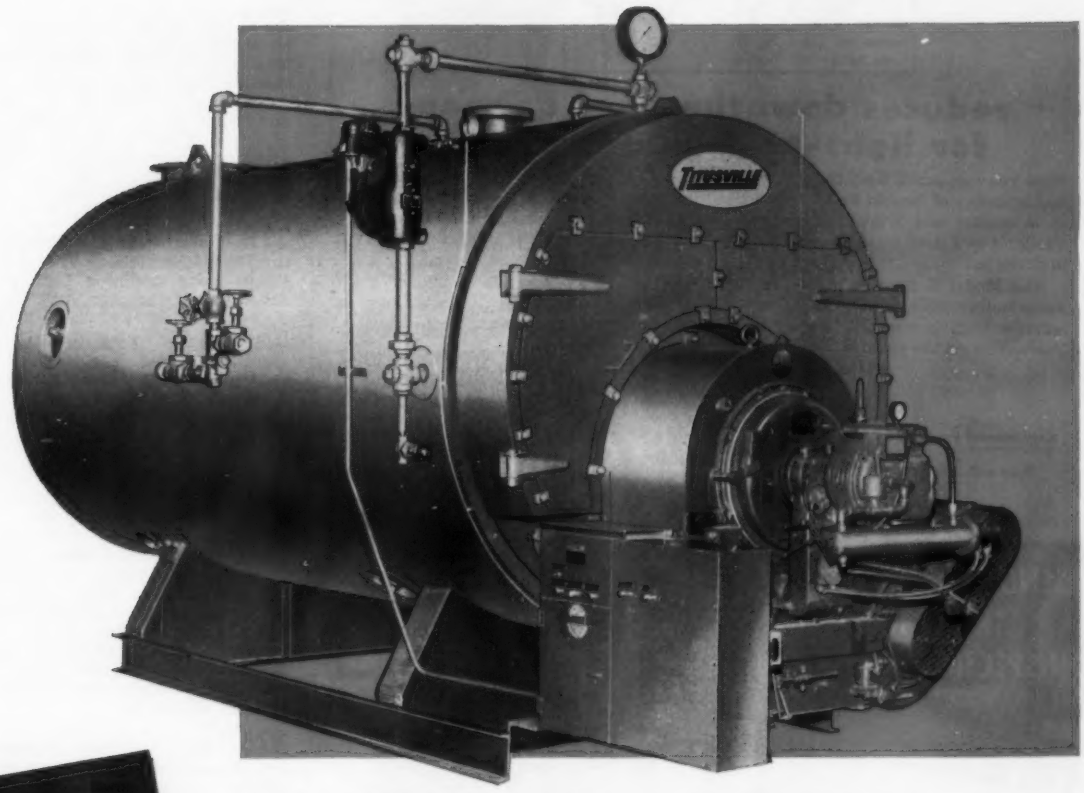
VALVES, TRAPS, PIPING

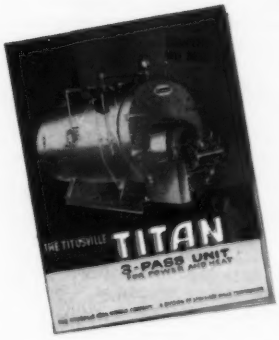
368 Valve Performance Facts—Included in this 36-pp booklet are 32 case histories of cost-saving valve installations. Service applications covered include steam, oil, water, coating fluid, chlorine, phenol, pulp stock, vacuum, others. Crane Co.

369 Corrosion-Resistant Valves—Eight-pp Bulletin 11 describes design features and applications of a line of Teflon renewable disc or seated valves designed to handle a wide range of corrosive solutions. Cutaway views showing construction details are included, as well as tables of dimensions. Alloy Steel Produtcs Co.

370 Industrial Valves — Bulletin 507V illustrates and describes company's line of industrial valves for control of air, gas, liquids and solids. Features photos and descriptive detail on a variety of valves, including butterfly valves, water valves, slide valves. W. S. Rockwell Co.

Now... meet the Titusville TITAN





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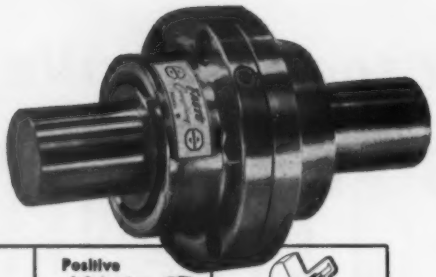

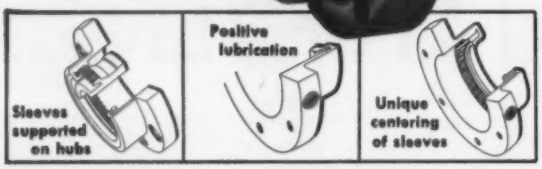

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DATA FILE

(Begins on page 240)

371 Stainless Steel Valves—Corrosion resistant stainless steel valves are featured in 32-pp Catalog 59SS. Features of design and construction are shown through cutaway views, and advantages of stainless steel in withstanding corrosive attack of chemicals and atmospheres are detailed. Jenkins Bros.

372 On Steam Traps—Catalog K is an enlarged 48-pp manual and steam trap catalog. New material provided includes open float and thermostatic traps, pipe strainer to 6 in. in steel and semi-steel, and helpful steam pipe sizing tables. Discusses fundamentals of good trapping, trap selection, installation, testing, repairs. Armstrong Machine Works.

373 Impulse Steam Traps—Bulletin T1744 describes a line of impulse steam traps designed for light condensate load requirements. Operation is detailed, and capacities, dimensions tabulated. Yarnall-Waring Co.

374 Swivel Joint—Features and advantages of company's swivel joint which permits fast, easy packing interchangeability are illustrated and described in Bulletin 1258. Table of specifications and properties are included, as well as dimensional data and diagrams. Chiksan Co.

375 PVC Pipe, Fittings—This 12-pp bulletin contains latest technical information on polyvinyl chloride pipe and fittings, including advantages and properties, general characteristics and applications, physical properties, installation instructions, flow rate charts and specifications. Mueller Brass Co.

376 Glass Pipe and Fittings—Corrosion-resistant qualities of this Pyrex brand glass pipe and fittings which make it suitable for use under corrosive conditions are described in 44-pp Bulletin PE-3. Operating temperatures, physical characteristics, installation procedures are covered and specifications and dimensional drawings given. Corning Glass Works.

377 Leakless Joint —Bulletin 1301 describes a swing joint designed to eliminate leaking of coolant. Applications are detailed and dimensional data and diagrams included. Combination Pump Valve Co.

378 Expansion Joints — Features and advantages of company's line of expansion joints and flexible couplings are illustrated and described in 12-pp Form AD-137. Standard dimensions and other engineering data are included. The Garlock Packing Co.

379 Guide to Couplings—This 26-pp general catalog describes company's quick-connect, quick-disconnect couplings, including a coupling for high pressure applications, for impact in air lines, for low pressure

applications, for vacuum and very low pressures, etc. Snap-Tite, Inc.

380 **Fluid Line Couplings**—Catalog 100 contains data sheets describing company's line of quick-connective fluid-line couplings for pneumatic, hydraulic, oxygen, acetylene, steam, various gases and liquids service. Photos and dimensional diagrams are included. The Hansen Mfg. Co.

Postage-free Reader Service Cards make it easy to order catalogs. Cards are provided on pages 235 and 236.

381 **Self-Cleaning Strainer**—Bulletin 1210B describes self-cleaning, semi-steel pipeline strainers in sizes from ¼ through 3 in., featuring high strength construction of the bodies, long tapered screen socket, perforated heavy-gage screen. Includes dimensions, weights. Sarco Co., Inc.

FILTERS, FILTERING

382 **Filters, Strainers** — Industrial Catalog 1058, 48 pp, provides application and engineering information on company's line of micro-filters and precision strainers. Fuel filters, full flow and by-pass lube filers, dry type air filters, air separators, and metal edge strainers shown. Purolator Products, Inc.

383 **Filtration Equipment** — Eight-pp Bulletin GEO-506 describes filtration equipment for micronic clarification of all types of fluids; lubricating and fuel oils; liquid chemicals and petro-chemicals; compressed air, carbon dioxide, and other gases; hydraulic fluids; electroplating solutions. Commercial Filters Corp.

384 **Pipe Line Filters** — Eight-pp Bulletin 200 contains detailed information on pipe line filters for air and other gases. Double action principle which gives sustained, trouble-free operation at high load factors is illustrated and explained. Specifications are included. Dollinger Corp.

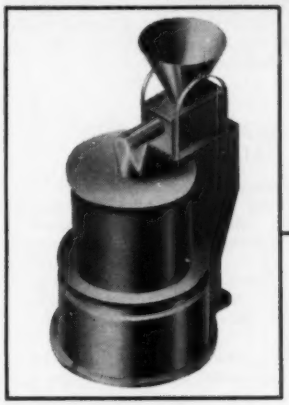
FANS, VENTILATING

385 **Propeller Fans** — Bulletin A-109C, 32 pp, covers company's line of propeller fans, including standard propeller, utility, cool-blast, Lo-Noise, reversible and Bi-Pass duct fans, intake air units and unit heaters. Contains new fan sizes not shown in the previous edition as well as revised air deliveries, specifications. Hartzell Propeller Fan Co.

386 **Induced Draft Fans**—Catalog L-3 describes induced draft fans designed for any induced draft application for temperatures up to 800 F. Gives dimensions, capacities, as well as installation data. Fuller Co.

387 **Industrial Fans**—Bulletin 690-A, 12 pp, contains dimensions and application and performance data on direct connected fans for general and

NEW JOHNSON MARCH VERTICONE



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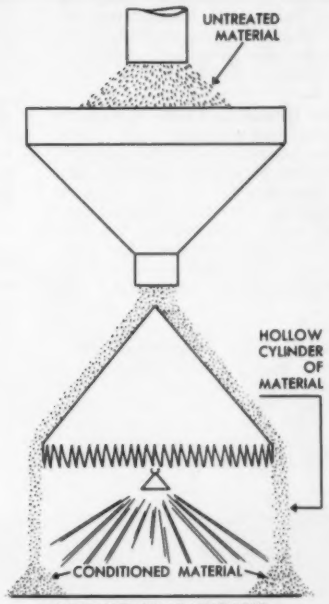

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DATA FILE

(Begins on page 240)

system ventilation and power roof ventilators, with air deliveries to 103,200 cfm. Design features and typical installations illustrated. Propellair Div., Robbins & Myers, Inc.

388 **Air Engineering**—Bulletin E-57 is a 24-pp air engineering data file covering engineering and test facilities for propeller fans, specifications, construction, maintenance, and installation. Tables for estimating air-handling requirements, entrance and elbow losses are provided. Aerovent Fan Co., Inc.

389 **Air Handling Units**—Complete engineering information on company's low pressure sprayed coil and high pressure dry and sprayed coil climate changers is incorporated in 56-pp Bulletin PB-290. Detailed descriptions and illustrations on the all-purpose air conditioners for commercial and industrial comfort and process applications included. The Trane Co.

390 **Power Roof Ventilators**—Bulletin 2302 is an 8-pp selection guide to company's low silhouette line of power roof ventilators. Dimensions, capacity tables, and details on accessories and protective coatings are included. Ilg Electric Ventilating Co.

391 **Industrial Diffusers**—Described in 8-pp Catalog F-7722 is a line of industrial diffusers designed for applications where full range air pattern adjustment is essential to human comfort. Complete dimensional data, diagrams and specifications are included. Barber-Colman Co.

LUBRICANTS AND LUBRICATION

392 **Lithium Greases**—This product information bulletin presents manufacturer's six Litholine industrial greases, stressing industry advantages offered by these multi-purpose greases. Gives properties of greases, application and performance characteristics. Sinclair Refining Co.

393 **Organized Lubrication**—Benefits of organized lubrication are extolled in this 24-pp bulletin. Cost control opportunities are detailed and the task of assigning responsibilities and delegating authority in an organized lubrication system discussed. Method of determining savings and setting up records to measure results covered. The Texas Co.

394 **Product Guide**—This handy little booklet gives information on manufacturer's line of industrial products—general lubricants, greases, diesel lubricating oils, metalworking oils, hydraulic oils, heat-transfer oils, waxes, petro-chemicals, spray oils, solvents, others. Sun Oil Co.

MATERIALS HANDLING

396 **For Overhead Handling**—Booklet 2008-N 12 pp, is repete with illustrative material on principal components of overhead handling systems. Track design and advantages of supporting it flexibly are described, and formulas and figures for comparing various track systems given. Cleveland Tramrail Div., The Cleveland Crane & Engineering Co.

397 **Electric Hoists**—Twelve-pp Bulletin DH 133D describes Speedway electric hoists of 500- to 4000-lb capacities. Fully illustrates and explains design features and gives details on suspensions and conducting systems. Clearance data included. Wright Hoist Div., American Chain & Cable Co., Inc.

398 **Jib Crane**—Bulletin 405 describes features and advantages of this self-supporting jib crane designed for multiple lifting and handling operations. Specifications and mounting diagrams are included. R. G. LeTourneau, Inc.

399 **Crane End Trucks**—Packaged crane end trucks for a variety of industrial applications are illustrated and described in this 8-pp bulletin. Dimensional data and diagrams are included. Borg-Warner Corp.

400 **Overhead Conveyors**—Essential information and profit-making ideas are contained in this one-volume library on overhead conveyors. Col-

HANDY ACCESSORIES

for Graphic Instruments

Model D, Portable, 7-range Current Transformer. Bulletin 155A.

Chart Inspector

This handy device makes it easy to inspect and make notes on E-A record charts. Catalog Section 80.

Split-core current transformers are made in 5 frame sizes. Ranges from 25 to 6000 amperes primary. Bulletin 255A.

Other Accessories to Make Recording Easier

Ammeter and Wattmeter shunts, Kva-Kvar phase-shifting transformers, double potential and isolating transformers, step-up potential transformers, chronograph pens, binding posts, carrying cases, quick connectors, cable clamps—all are described in Catalog Section 80.

Ask for Bulletins 155A, 255A and Catalog Section 80

Product Representatives in Most Principal Cities

The ESTERLINE-ANGUS Company, Inc.

Pioneers in the Manufacture of Graphic Instruments

Dept. J, P. O. Box 596, INDIANAPOLIS 6, INDIANA

For more facts circle 671 on Reply Card

Fine tools that encourage Good Work

ARMSTRONG WRENCHES

An ARMSTRONG Wrench feels right—is balanced. It goes over nuts or screw heads easily, grips firmly without sloppiness, won't round corners—because openings are carefully machined to correct sizes. It's safe, strong beyond need without clumsy bulk—because of superior design and selected steels, heat treated to proper degree of hardness and tensile strength. It's quality finished, ARMALOY (alloy steel) Wrenches in chrome plate with heads buffed; HI-TEN (carbon steel) Wrenches in baked-on gray enamel with heads ground bright . . . all plainly marked for size. All are uniformly excellent tools manufactured under strict quality control, by modern methods, with modern equipment in a modern tool plant . . . 1537 different industrial sizes and types—single wrenches, or sets in metal cases, boxes or rolls . . . each a quality tool. Armstrong Wrenches are "Fine tools that encourage good work."

If you don't know your local ARMSTRONG Distributor, we will send you the names of those in your area.

ARMSTRONG BROS. TOOL CO.
5207 W. ARMSTRONG AVE.
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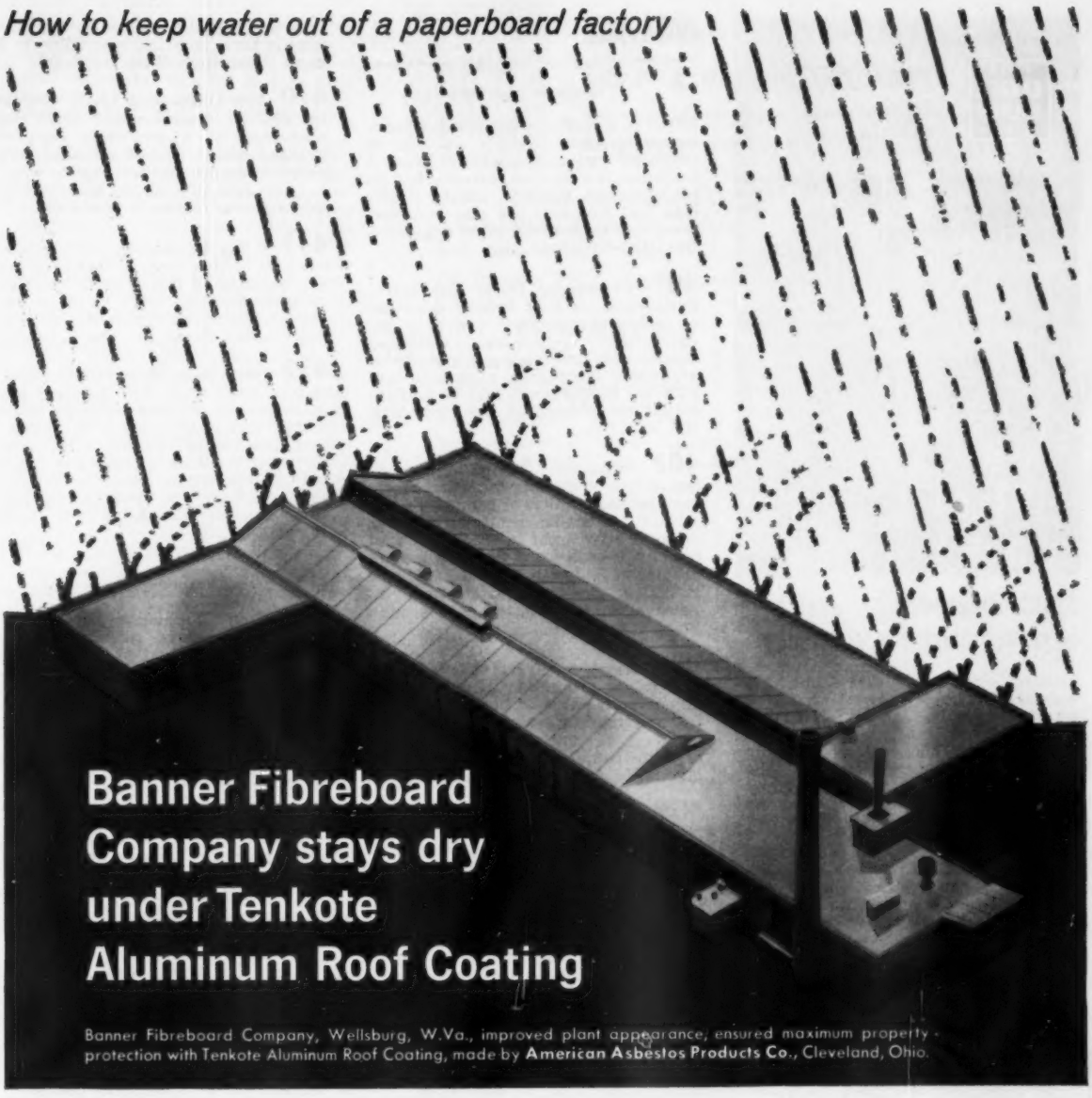
How to keep water out of a paperboard factory



Banner Fibreboard Company stays dry under Tenkote Aluminum Roof Coating

Banner Fibreboard Company, Wellsburg, W.Va., improved plant appearance, ensured maximum property protection with Tenkote Aluminum Roof Coating, made by **American Asbestos Products Co.**, Cleveland, Ohio.

A paperboard manufacturer understandably needs a waterproof roof. That's why the maintenance superintendent of Banner Fibreboard Company recently restored his plant's composition roof with Tenkote Aluminum Coating, made with ALCOA® Pigments.

Investment in material and labor was modest. One application of Tenkote saved a badly deteriorated surface, sealed cracks and small holes, heightened appearance. The clean, reflective aluminum look improved the whole building.

Aluminum coatings like Tenkote are preferred protection today on hundreds of public and industrial buildings. Here's why. Maintenance experts have found that one coat seals any surface—metal, masonry, composition—with a moisture-proof shield that won't sag or run in summer or crack in winter.

The reflective aluminum surface turns back 70 per cent of the sun's heat, reduces inside temperatures as much as 15 degrees. Applied with ordinary roofing brush or special spray equipment, these coatings come ready mixed . . . require no thinning or heating.

Look at *your* roof today. Leak? Look bad? A fibrated aluminum coating like Tenkote will restore like-new appearance, weatherproof your property for years.

ALCOA does not make aluminum roof coatings, but we will be happy to refer you to reputable manufacturers who do. Write for our booklets, *Painting With Aluminum* and *Aluminum Asphalt Roof Coatings Make Time Stand Still.*

ALCOA ALUMINUM

Look for this label . . . it's your guide to the best in aluminum value

For exciting drama watch "Alcoa Theatre," alternate Mondays, NBC-TV, and "Alcoa Presents," every Tuesday, ABC-TV

Aluminum Company of America
1740-E Alcoa Building, Pittsburgh 19, Pa.
Please send your free booklets:
☐ *Aluminum Asphalt Roof Coatings Make Time Stand Still* ☐ *Painting With Aluminum*

Name_____

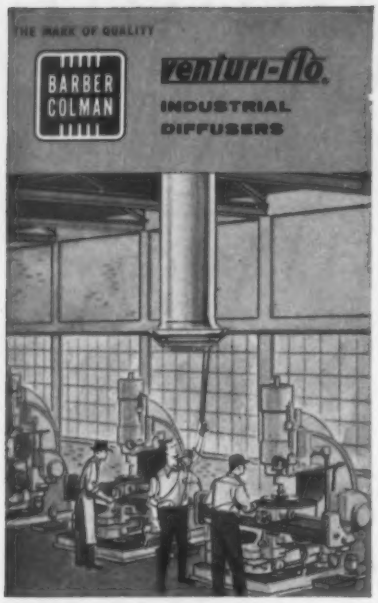
Company_____

Address_____

City_____ Zone____ State_____

Support your local Clean Up—PAINT UP—Fix Up Campaign

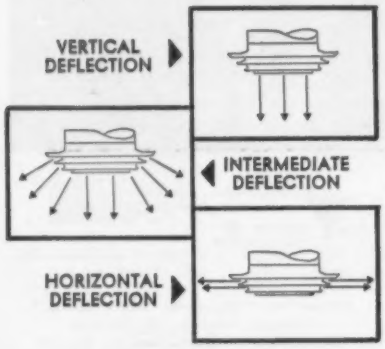
For more facts circle 673 on Reply Card



Fresh air at working level improves employee efficiency

Barber-Colman Model BP Venturi-Flo industrial diffusers permit air to be piped down to working level. This prevents stagnant, smoky air which has collected near the roof, from being mixed with the incoming fresh air. The contaminated air is readily expelled by roof exhaust fans. Employee comfort and efficiency are measurably improved.

The Venturi-Flo industrial diffuser can be adjusted easily from the floor to deliver any air pattern. In warm weather, the air should be delivered close to, or even directly at, the worker; while



during cool evenings, or in cold weather, the air should be diffused above the head of the worker, providing adequate ventilation, but eliminating cold drafts.

A complete range of sizes is available to meet any industrial requirement. Get complete information in Bulletin F7722-1 — performance data, installation diagrams, and dimensions. Call your Barber-Colman field office or write:

BARBER-COLMAN COMPANY

Dept. Q, 1139 Rock Street, Rockford, Illinois

For more facts circle 674 on Reply Card

DATA FILE

(Begins on page 240)

lected in a single folder are engineering data, field reports on use of overhead conveyor systems, product bulletins, material on features, tips on maintenance. Pictures, charts, drawings and diagrams are also included. Available to qualified plant engineers. Rapistan-Keystone, Inc.

401 **Continuous Power Conveyor**—Sixteen-pp Catalog A-96-R describes a packaged overhead conveyor for light duty applications. Describes components and discusses lubrication and chain safeguards. Suggested layouts are diagrammed and typical installations illustrated. Richards-Wilcox Mfg. Co.

403 **Adjustable Ramps**—Engineering details and other information on use and installation of company's hydraulic adjustable ramps for loading docks are featured in this illustrated bulletin. Two types of dock equipment are treated—the Adjust-A-Dock, installed in the loading platform or at its level, and one installed at ground level. Rowe Methods, Inc.

404 **Boxes and Trays**—Contained in this folder are separate data sheets on company's line of boxes and trays for moving, storing and drying. Advantages of construction and design are illustrated, and dimensional data given. Molded Fiber Glass Tray Co.

405 **Ball Bearing Trolley** — Book 2636, 20-pp, on ball bearing trolleys, tells how help maintains efficiency of trolley conveyors. Includes data on types and sizes of trolley as well as selection of new trolleys and attachments, and replacement of units in existing installations. Also gives application and maintenance information, data on trolley wheels, rollers for roller turns. Link-Belt Co.

406 **Caster, Wheel Manual** — Featured in 192-pp Manual 65 is comprehensive information on company's complete line of casters, wheels, glides, desk shoes and accessories. Profusely illustrated with photos and dimensional drawings and diagrams of the various types of casters and wheels for a variety of applications, the manual contains tabulated engineering and price data. Darnell Corp.

SLINGS, CHAINS, WIRE ROPE AND FITTINGS

408 **Sling Handbook** — Form SL-3 is an illustrated 40-pp reference book covering more than 80 subjects on slings and fittings. Included in this revised edition is reference information condensed into handy chart form on sling types, dimensions and rated loads. Union Wire Rope Corp.

409 **Slings For Industry**—Bulletins 5886 and 5308-R describe Safe-Guard cable-laid slings, designed for applications where a soft sling body is required and where flexibility is more important than resistance to abrasion; and rope-laid slings for applications where abrasion resistance is a must. Macwhyte Wire Rope Co.

410 **Self-Lubricating Chain**—Bulletin SLC-57 describes and illustrates exclusive, oil impregnated sintered bushing design feature of company's self-lubricating roller chain. Engineering data, dimensions and application reports. Whitney Chain Co.

411 **Sling Chains**—Seven points to consider when buying sling chains are outlined in this product bulletin. A working load limit table is included. American Chain Div., American Chain & Cable Co., Inc.

412 **Wire Rope Data**—Characteristics of wire rope and its care and maintenance are covered in an interesting series of product bulletins—Bulletins 101-107. The bulletins cover abrasion, crushing, storage and lubrication, inspection, bending fatigue, localized wear, and selection information. Leschen Wire Rope Div., H. K. Porter Co., Inc.

MAINTENANCE

413 **Metal Treatment**—Booklet 15 describes a metal treatment that stops rust action and prepares rusted metal for paint. Advantages are detailed and application method illustrated. Rusticide Products Co.

414 **Basic-Roofing Information** — "What You Should Know About Your

PUNCH PRESS SHOCK STOPPED

Problem: To cushion the dangerous shock of this 400-ton capacity Clearing Press at the RCA-Whirlpool-Seeger Plant in St. Paul, Minn.

Solution: Unique Resilient Mounting by Korfund System engineers. It protects the structure, nearby equipment, personnel and the press itself from any shock damage. Substantial savings of money were effected, too, since no special foundations or costly reinforcement were needed.

To get answers to all vibration, shock and noise problems, write for our interesting Booklet 62. To obtain an answer to your *specific* problem, send for a complete Engineering Recommendation free. Just fill in and mail today the coupon on page 244.

THE KORFUND CO., INC.

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IN CANADA: 510 CANAL BANK, VILLE ST. PIERRE, MONTREAL 32, QUEBEC, CANADA

For more facts circle 675 on Reply Card

Roof" is a 40-pp clearly illustrated booklet which tells what makes a roof fail, how to recognize signs of roof deterioriation, what to do to keep a roof in good condition. Discusses roofing practices. Johns-Manville.

415 Handbook on Coatings—This 1958 Coating Manual is a 32-pp treatise highlighting the stopping and preventing of rust on nearly all types of rustable metal. Book contains information and recommendations to enable determination of specific coatings needed. Basic principle of Rust-Oleum's fish oil penetration into metal is shown. Rust-Oleum Corp.

417 Color Conditioning—How to put the power of color to work profitably is explained in this 28-pp color conditioning booklet. Tells how color conditioning boosts production, improves morale and promotes safety, and includes some full-color photos to illustrate "before-and-after" situations in typical plants. E. I. du Pont de Nemours & Co., Inc.

418 Aluminum Coating—An aluminum coating designed to protect against rust and corrosion which can be applied by brushing, spraying and dipping is described in this product bulletin. Gulf Oil Corp.

419 Guide to Maintenance Products—Catalog 56, 48 pp, on industrial maintenance paint products lists specialized coatings to resist alkalies, acids, oils, grease, moisture. Book also covers waterproofing, roof coatings, caulking compounds, floor patching materials. Gives technical information on paints for special applications. Steelcote Mfg. Co.

420 Industrial Steam Cleaners—Advantages of cleaning with steam are illustrated and described in this 6-pp bulletin. Applications for heavy-duty production cleaning, paint-stripping phosphatizing are detailed and complete specifications on the portable cleaning units. Turbo Machine Co.

422 Cleaning Machines—Pipe and drain cleaning machines and accessories are described in 8-pp Price List 758. Illustrations as well as descriptive details and prices are included. Kollmann Mfg. Co.

TOOLS, MACHINE SHOP

424 Where to Use Your Stud Driver Twenty-pp pocket-size Form 955 describes and pictures applications of studs, using company's Model 450 stud driver. Provides some operating hints and safety precautions and covers use of studs through steel into concrete, wood into concrete, wool into steel and steel into steel, as well as their use in attaching pre-drilled fixtures. Remington Arms Co., Inc.

425 Pipe Tools—Ordering and application information on Ridgid pipe tools is provided in 16-pp illustrated Catalog 7596 R6. Wrenches, cutters, threaders, reamers, vises, and others are pictured and described, also power drives. The Ridge Tool Co.

(Continued on page 258)

THE MARK OF QUALITY
BARBER COLMAN

Motor Operators for control of

valves, dampers, sequencing devices and other similar applications

Barber-Colman offers a line of electric motor operators for operation of a wide variety of control mechanisms. A few applications include steam and water valves, butterfly valves, multiple ratio fuel valves, oil and gas burners, Vortex control, speed-changing screws, exhaust dampers.

FEATURES

Control Forms
Two-position, floating, proportional.

Valve Linkages
Wide variety of factory-assembled Barber-Colman motor-operated valves available. Motor operators may be used to operate other makes and types of rotary or slip-stem valves.

Output Torque Range
16 to 750 lb in.

Adjustable Timing
Optional.

Power Requirements
24, 115, or 230-volt, a-c only.

Limits of Travel
180° standard. Other limits available.

Auxiliary Switches
Some models incorporate built-in auxiliary switch. Auxiliary switch kits available for others. Adjustable.

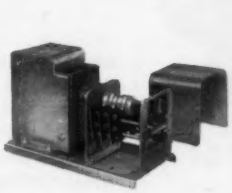
Output Shaft
½" or ¾" diameter, depending upon output torque.

Gear Train
Precision-hobbed gears.

Typical Motor Operator

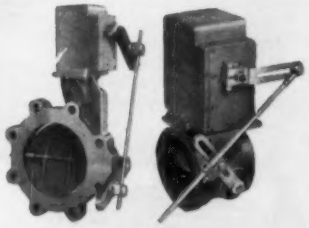
Adjustable Drive Crank
Crank arm range adjustable from ⅞" to 3⅛". Adjustable on shaft through 360°.

Oil-Submerged
Barber-Colman shaded pole induction motor and gear train sealed in oil for long life and maintenance-free operation.



Sequence Controller

Globe Valve



Butterfly Valves

Proportional Motor Operator with Integral Temperature Sensing Bulb and Control Mechanism.

Provides proportional control of temperature regulating devices—a control system in itself for many applications. Can be used on any valve assembly or controller normally furnished with Barber-Colman proportional operators. Positive positioning. Adjustable throttling range. 10 feet of armored capillary furnished as standard. Two-wire connection to any convenient 115-volt power source.

Call your Barber-Colman control office or write today, outlining your requirements.

"Better Control . . .Electrically"

BARBER-COLMAN COMPANY

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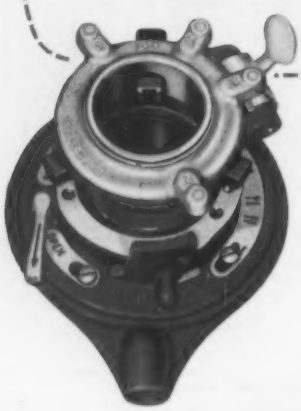
Dept. Q, 1339 Rock Street, Rockford Illinois, U. S. A.

With these 3 RIDGID®
Jam-Proof Pipe Threaders
my power drive threading is Safe...
...no watching to keep them from jamming
...save me a lot of time, too!



1" to 2" Pipe
RIDGID 65R-TC
Jam-proof—can't jam if you forget it . . . Threads 4 sizes of pipe and conduit with 1 set of dies . . . True-Centering workholder—no more crooked threads—but adjustable for drip threads. Far more for your money—compare!

2½" to 4" Pipe
RIDGID 4PJ
Jam-proof . . . drive pinion kicks out automatically—real safety when power threading. Workholder sets to size before putting on pipe. Other exclusive advantages. Special 4PJ for conduit.

4" to 6" Pipe . . . RIDGID 161
Jam-proof for safe power threading. 1 set of dies threads 4", 4½", 5" and 6" pipe and conduit—sets to size fast. Workholder sets to size before putting on pipe, a work-saver feature. Many other reasons why the 161 is your best buy!

See and try these popular RIDGID Threaders . . . at your Supply House.

THREADED PIPE . . . It's Tight . . . It's Best . . . Costs Less!
For more facts circle 677 on Reply Card

NEW PRODUCTS

(Begins on page 168)

75—PIPE HANGER RING for variety of uses

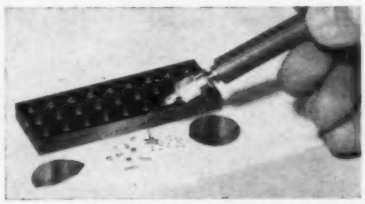
This adjustable pipe hanger ring provides a single unit which can be used in many applications. It consists of a metal band and a locking insert for attachment to a threaded hanger rod. The insert is self-locking through spring action as well as through the weight of the pipe supported. The ring is available in zinc or copper plate as standard, for pipe sizes from ½ through 3½ in. The band may be reshaped on the job if required. The wide band is said to make the ring well suited to installation of plastic pipe. Installation involves simply squeezing the ring so insert drops out, spreading and slipping over pipe, and squeezing again to replace insert. Automatic Sprinkler Corp.

76—ELEVATOR PULLEY offers easy belt tracking

These welded-steel bucket elevator pulleys have roll crowned pulley rims for easy belt tracking. Two types are available; face widths up to and including 13 in. are made with one center disc; and pulleys with wider faces have two discs and two hubs. Center discs are corrugated so that pull stresses resulting at the hub section are dissipated. Hubs, saw-slit through one side, have tapered shoulders which match the inside tapered bore of the discs. High-tensile bolts pull each hub into its mating disc and clamp pulley to its shaft. The American Pulley Co.

77—VACUUM SYSTEM for handling tiny parts

The Vac-U-Grip System is suggested for use where small, fragile parts must be handled fast, easily and accurately. The tool is connected to the vacuum system by light-weight, flexible tubing. A solenoid-operated valve between vacuum line and pick-up element is controlled by a foot-operated switch that lets the operator release the suction



when the part is correctly positioned. The system can be furnished in single or double stations, each including Vac-U-Grip tools, interchangeable tips, solenoid valves, manifold, switches, tubing and connectors. It requires 115-v, 60-cycle power. Connection shielded leads permitting electrical testing can be furnished. Carman Laboratories.

78—EPOXY RESURFACER welds to materials

Valdura Epo-Surfacer, a solids epoxy coating, is claimed to literally weld to masonry, wood, ferrous and non-ferrous metals, and to be waterproof and impervious to oils, greases, alkalis, acids and solvents. When used to patch cracks in a concrete floor it forms a bond stronger than the concrete itself, says manufacturer, it can be feathered, and it offers slip-proof qualities and flexibility. A three-component product, blended on the job, Valdura Epo-Surfacer is spread over a cleaned surface with screed bar and trowel. American-Marietta Co.

79—VINYL COATED TAPE seals, joins ducts

Permacel 676 Silver Duct Sealing Tape is designed for joining and sealing sections of duct work in heating, ven-

tilating and air conditioning systems. In this pressure-sensitive tape, the combination of cloth backing and adhesive used is said to provide an effective seal against air leaks. According to manufacturer, this vinyl-coated tape has excellent resistance to temperature fluctuations as well as solvents, abrasion and aging. Permacel.

80—ALARM photographs the thief in action

Photolarm features a hidden camera. It is designed to photograph a burglar in daylight or in total darkness (with invisible light) and simultaneously ring a loud bell alarm. Manufacturer says the unit is compact, reasonably priced and camouflaged, so that thieves who invade the area are not aware of how they have set off the camera and alarm. Photolarm is installed by plugging into a conventional a-c outlet; it can be used to provide a ring of protection around safes, file cabinets, etc. Photolarm, Inc.

81—LIGHT-WALL FITTINGS for process piping

Light-wall stainless steel fittings and flanges in the Pipe-Mate line are for nominal-temperature, low-pressure, non-critical process piping. Pipe-Mate Fittings will be stocked in ½-through 4-in. sizes, Schedule 5S and 10S, in stainless steel grades suited to corrosive applications in the area of roughly 150 psi or less, it is announced. Besides providing lower-cost fittings for non-critical applications, the line features long tangents that permit easy alignment of fittings and pipe and allow clearance for fabrication of completely flanged elbows, returns, tees and crosses.

A feature of the line is a swivel-type carbon steel insert flange having a stainless steel insert at the bore into which pipe or fitting can be expanded. Then the carbon steel portion is simply rotated to line up the bolt holes and tightened. No welding is involved. Another feature is a reversible fitting called the Plug-R-Cap. Butt welded in regular position it is a cap; reversed it can be fillet welded to act as a plug or pipe closure. Pipe-Mate Fittings can be butt welded or, with the use of an alignment connector or sleeve they can be fillet welded or brazed. Tube Turns Div., Chemetron Corp.

82—CASTABLE is strong, long lasting

Exceptional crushing and rupture strength are reported for Hydrecon TabCast. According to manufacturer, it is the strongest known tab-alumina castable and the first in the 3500 F range, and will outlast other known castables of its type. Crushing strength of 10,800 psi at 1500 F and 11,200 psi at 2500 F are announced for it. Its low iron content—less than 1/10 of 1 per cent—makes Hydrecon TabCast an excellent castable where carbon and reducing atmospheres or effects from high sulfur oils and other detrimental fuel conditions would make many castables impractical, it is pointed out. It has an alumina content of 93.66 per cent. It comes in dry form and, after mixing with water, may be poured or cast. J. H. France Refractories Co.

83—DRAFTING UNIT is compact, portable

Draftette Senior No. 12 retains all the advantages of its popular smaller predecessor, folds like a jacknife to fit into a briefcase and can be opened to attach to its drawing board, a desk or table in seconds. It is constructed of aluminum, black anodized, and features a one-piece 6 by 9 in. interchangeable scale with specially processed white numerals, it weighs 3½ lb. It is divided into 16ths or 10/50ths, with a 360-deg protractor. With a 20-by-26 in. drawing board, it features 400 sq in. of drawing surface. David Miller & Associates.

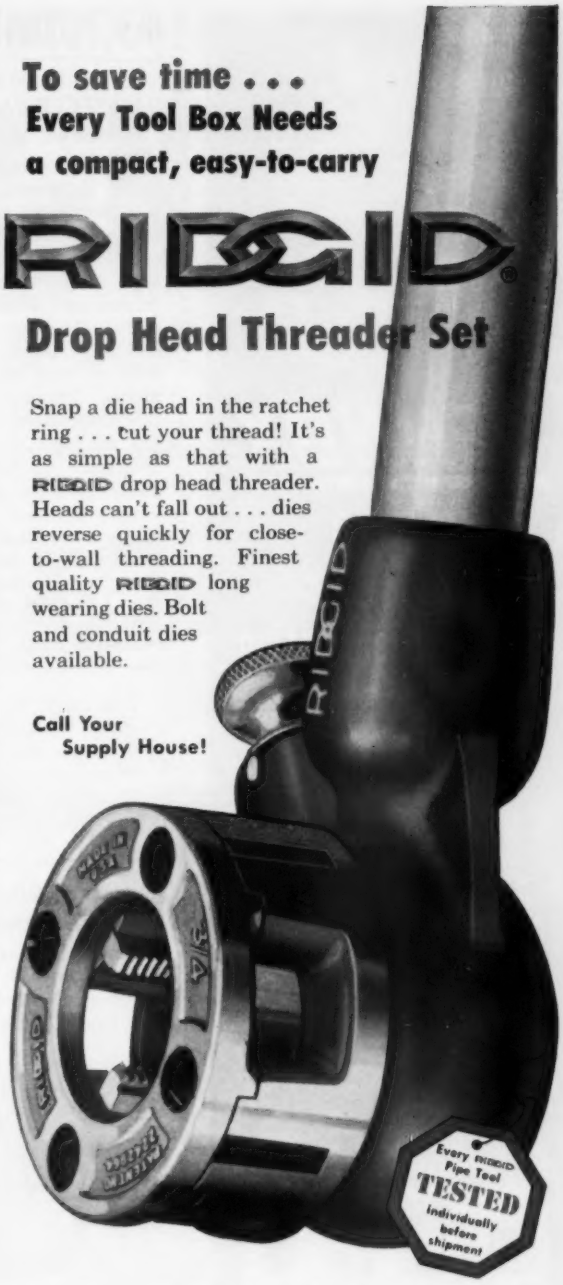
To save time . . .
Every Tool Box Needs
a compact, easy-to-carry

RIDGID®

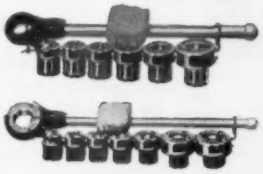
Drop Head Threader Set

Snap a die head in the ratchet ring . . . cut your thread! It's as simple as that with a RIDGID drop head threader. Heads can't fall out . . . dies reverse quickly for close-to-wall threading. Finest quality RIDGID long wearing dies. Bolt and conduit dies available.

Call Your Supply House!



Hand Carrier Free With All Sets Except No. 12-R
(Order in sets or any combination)



Exposed Ratchet Type
For pipe—⅛" to 1"—00-R
⅛" to 1¼"—111-R
⅛" to 2"—12-R
For bolts—¼" to 1"—00-RB

Enclosed Ratchet Type
For pipe—⅛" to 1"—0-R
⅛" to 1¼"—11-R

RIDGID®
The Ridge Tool Company • Elyria, Ohio, U.S.A.
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"OG" SERIES

LENNOX

brings a

New Era

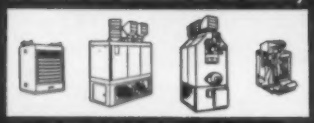
to Industrial Heating

- One Unit for Space Heating, Ventilating, Make-Up Air, Oven Applications and Drying
- Gas, Oil or Combination Burners
- Automatic or Manual Fuel Selection

Never before has one heater handled so many jobs so well, at such a sensible cost.

Completely proven and tested, the "OG" series can be used as a central system . . . with ducts . . . or as a unit heater. Installation may be horizontal, vertical, suspended or floor mounted. Dynamically balanced blower delivers a huge volume of air . . . with super-quiet action. But this just begins the "OG" story . . . write for full specs . . . see for yourself how Lennox has made the basic change in industrial heating.

LENNOX "Task Matched" Equipment to control and condition air for industry



64,000 to 2,000,000 Btuh Units

CLIP AND MAIL FOR FREE SPEC SHEETS

LENNOX Industries Inc.
INDUSTRIAL DIVISION
1701 East Euclid, Dept. PE5,
Des Moines, Ia.

Please send me—without obligation—complete specifications and engineering data on Lennox "OG" Series Industrial Heaters

Name_____

Company_____

Address_____ City_____

Title_____

For more facts circle 679 on Reply Card

NEW PRODUCTS

(Begins on page 168)

84—SECONDARY INDICATOR shows primary readings

Similar to company's standard electronic secondary indicator but about one-quarter the size, the Yarway Miniature Indicator is designed to duplicate readings from a primary liquid level indicator or differential pressure transmitter anywhere in the plant. The miniature design substitutes a transistorized amplifier in place of the vacuum tube design in the full-size model. The unit weighs about 5 lb; face dimensions are 2½ in. wide by 6¼ in. high. It is suggested for instrument panels where fluid lines under pressure are undesirable, for remote locations where distance precludes use of pressure tubing, where freezing may be encountered, and where installation is far above liquid level. Details are in Bulletin WG-1824. Yarnall-Waring Co.

It's easy to obtain product data with the postage-free Reader Service Card provided on pages 235-236. Use them for information on advertised products, also.

85—V-S DRIVE is shaft-mounted, mechanical type

Shaft mounting allows the unit to be mounted directly to the drive without intermediate transmission elements. The new variable speed drive is designed for applications where space limitations dictate that the output shaft be at right angles to transmission. It is reported especially adaptable to applications requiring controlled speed in a lightweight and compact power drive. Available in drip-proof or totally enclosed construction, these ¼- to 3-hp units feature speeds from 360 to 5.2 rpm, and speed variations 2:1 to 10:1. Sterling Electric Motors, Inc.

Remember!

PALMETTO Packings

– pack more performance into every application

GET THEM at any industrial distributor authorized to carry Palmetto Packings . . . For the name of a supply house near you consult our insert in Thomas Register—between pages 4816-4817.

GREENE, TWEED & CO.
North Wales • Pennsylvania

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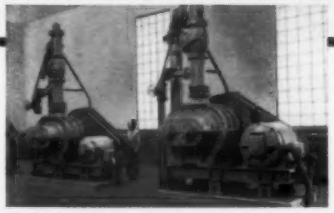
BLOWER NOISE SILENCED IN RESIDENTIAL AREA



Problem: To prevent the transmission of vibration and structure-borne noise from these three Sutorbilt Blowers at the Sewage Treatment Plant in a residential area of San Jose, Calif.

Solution: Unique Resilient Mounting by Korfund System engineers. It prevents local citizen complaints, provides trouble-free operation, cuts foundation costs substantially.

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It resists corrosion and extreme weight. Reduces floor repairs and reduces costs of labor and lost time. Protects new concrete, resurfaces or patches old.

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protection for machinery and equipment heretofore impossible with an air dry organic finish

EPO-LUX 100

(AN EPOXY PRODUCT)

Protects against corrosion of acids, alkalis, and moisture where other coatings fail.

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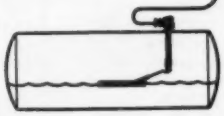

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DATA FILE

(Begins on page 240)

426 Industrial Tools—Information on a complete line of industrial tools, including 500 new types and sizes never before offered, is presented in 120-pp Catalog 57. Included are complete lines of wrenches, socket wrenches, drop forged clamps, tool holders, set up and hold down tools, cutting tools and pipe tools. Photos, drawings and numerous charts aid selection. Armstrong Bros. Tool Co.

428 Portable Electric Tools—Form 10 features a complete line of portable electric tools including drills, screw-drivers, impact wrenches, magnetic drill presses, sanders, grinders, hammers, holesaws, and forged tools. The Black & Decker Mfg. Co.

429 Power Tools—Industrial construction and other portable power tools for the manufacturing, construction, woodworking and metal-working industries are described in this 50-pp catalog. Tools appear in logical sequence of size and duty rating. Skil Corp.

430 Powder Actuated System—Two booklets cover applications of a powder actuated fastening system. One booklet shows how it can be used for plant maintenance — fastening conduits, bus ducts, junction and outlet boxes, surface raceways, fixtures and frames, etc. The second booklet indicates the correct fastening and charge to use to fasten materials to concrete or steel. Ramset Div., Olin Mathieson Chemical Corp.

431 Data for the Shop—"Fluids and Facts for Metal Working" is a pocket-size booklet of about 44 pp. A section on metal working fluids covers their function and selection, preparation and use of soluble oils and paste compounds, and prevention of dermatitis. Conversion tables, steel numbering systems, machinability ratings. Standard Oil Co. (Ind.)

432 Shop Equipment—Work benches, tool stands, shelving and other pressed steel equipment for the shop, laboratory and assembly line are shown in 8-pp Form 2299. Construction features and specifications of size, top material, equipment variations. Standard Pressed Steel Co.

METALS

434 Aluminum and Steel Data—Comprehensive selection data on aluminum and steel available in stock for almost every application is presented in this 242-pp buying guide. Necessary weights, dimensions and descriptive data are tabulated. Individual sections cover structural shapes, construction products, plates, sheets, hot rolled bars, cold finished bars, alloy and tool steel, tubing, stainless steel, aluminum, others. Joseph T. Ryerson & Son Inc.

435 Molybdenum in Steel Castings—This 36-pp brochure on the role of molybdenum in steel castings for industrial equipment discusses hardenability, tensile properties, fatigue, hardness, wear and impact resistance, machinability, and weldability of cast steels. Climax Molybdenum Co.

INSTRUMENTS, CONTROLS

436 Precision Instruments — Catalog G1 contains 32 pp of comprehensive information on indicating, recording and controlling instruments. Contains descriptive and illustrative data on potentiometers, pyrometer supplies, systems and components, null indicators, amplifiers and oscillographs, pressure gages, flow and liquid level meters, others. Minneapolis-Honeywell Regulator Co.

437 Ion Exchange Controls—Six-pp Bulletin E-156 describes automatic controls for ion-exchange equipment. Various elements in the control cabinets, as well as all the power-operated units, are covered and construction features are detailed. Illinois Water Treatment Co.

438 Electronic Controller—Specification Sheet GE-60001 describes an electronic temperature controller for electric heat treating furnaces and

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Weighs less. Uses less space. More efficient. More economical. More easily installed. Usually costs considerably less. Ask for complete data, including prices. See our ad in last month's PLANT ENGINEERING.

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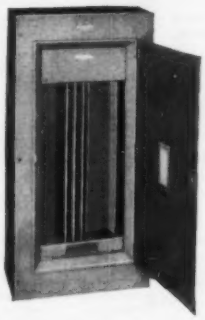

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Mains, 250, 400 or 600 amperes—for single phase 3-wire, 3-phase 3-wire, 3-phase 4-wire.

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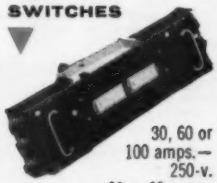

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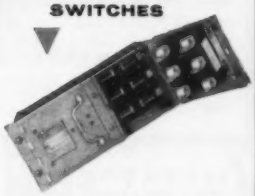

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Plug-in branches, used with filler spacers in enclosures larger than necessary for immediate requirements, make it easy to change switch capacities or add extra branches in the future. Choose from two types of plug-in switches—pull-out or hinged type.

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DATA FILE

(Begins on page 240)

other applications. Features and operation discussed in detail. Hagan Chemicals & Controls, Inc.

439 Graphic Instruments — Featured in 16-pp Catalog 657 is a line of graphic instruments designed to serve a variety of industrial measuring applications. Complete descriptive details on various types of recorders and accessories included, as well as ratings. The Esterline-Angus Co., Inc.

440 Control Pilot—Bulletin 583 describes characteristics of a liquid level control pilot which uses a fixed metering orifice to restrict the air supply. A schematic sectional view illustrates operation features and tables list characteristics. Leslie Co.

CONSTRUCTION

441 Tubular Building Frames—Described in 6-pp Bulletin 5M are advantages of company's line of tubular building frames which require no welding, cutting, riveting or bolting at building site. Design and construction details are illustrated. Swiss Fabricating, Inc.

442 Foundation Pipe Piles—Comprehensive information on Taylor Forge spiral-weld foundation pipe piles is presented in 24-pp Form F-5677. In addition to detailed specifications, the illustrated booklet describes a number of pipe-pile installations and includes driving logs. L. B. Foster Co.

443 Open Web Joists—Standard and long span open web steel joists are illustrated and described in this 38-pp catalog. Advantages of the steel joist construction are detailed, and sections are included on design calculation, properties and dimensions. United States Steel Corp.

444 Watertight Concrete—A summary of authoritative thought on design and specification of watertight concrete is given in 6-pp folder. Covers basic requirements and tells how Pozzolith reduces permeability, shrinkage, bleeding and segregation to produce strong, durable structural concrete. The Master Builders Co.

445 Replacement Glazing—Twelve-pp Booklet PL-251 gives detailed information on glazing industrial and other buildings with flat panels of the acrylic plastic, Plexiglas. Written for plant engineers concerned with frequent breakage of windows or other glazing problems, this practical booklet gives properties of this sheet. Plastic Dept., Rohm & Haas Co.

446 Aluminum in Colors—This bulletin introduces Alcoa's Alumalure colored aluminum architectural building sheet products, a complete line of sheet products offered in 11 colors. Aluminum Co. of America.

447 Unit Wall Construciton—Twelve-pp Technical Bulletin UW-100-5 describes and illustrates application of company's Uniwall for complete single unit, moderate cost, wall construction in buildings of all types. The bulletin contains construction details. Natco Corp.

448 Insulated Curtain Walls—Technical Manual 2786 contains description, details and application methods of Gold Bond Asbestostone Panels. Includes specifications as well as photographs and dimensional drawings showing construction details. National Gypsum Co.

449 Steel Floor Plate — Skid resistance and other advantages of USS multigrip rolled steel floor plate are stressed in this illustrated bulletin. Also gives dimensions, data on loads. United States Steel Corp.

450 Non-Slip Flooring—Algrip, an abrasive rolled steel floor plate described as non-slip even on steel inclines, is the subject of Booklet AL-29, 8 pp. Discusses safety features, fabricating. Alan Wood Steel Co.

451 Grating, Stair Treads—Bulletin 1105, 16 pp, describes construction and design advantages of company's line of interlocked grating and stair treads. Contains detailed information, photos, drawings and engineering data on rectangular, diagonal, radial and serrated gratings, stair treads, armoring. Dravo Corp.

Bowser remote control valves for hazardous liquids

Do these things

1. Simultaneously control flow of liquid in pipe and start or stop pump.
2. Operate one or more discharge lines from single remote power pump.
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Bowser Figure 221 Remote Control Valve consists of a quick-acting bronze gate valve and explosion-proof mercury switch integrated for easy, in-line mounting on any pipe line. Valve and switch are actuated by weighted handle. When handle is released, flow and pump stop simultaneously.

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IT WILL SAVE MONEY.

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- Truck Actuated
- Counterbalanced
- 27" Lip Travel

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The TAL "Adjust-A-Dock" will improve freight transfer, provide safer operation and reduce manual labor. Completely powered by the freight carrier, the platform deck is lowered to the truck bed from its raised, standby position as the truck is backed into the truck lever arms. The platform adjusts to the bed during freight transfer. When the truck pulls away, the platform automatically returns to the "up" position. Its rugged construction and basic operation assures minimum maintenance and long life.

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high speed - high efficiency

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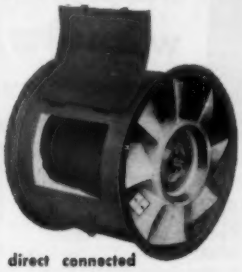

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Aerovent FANS — *Aerovent*

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DATA FILE

(Begins on page 240)

PLASTICS, SYNTHETICS

452 Guide to Plastics—This 64-pp catalog contains detailed information on plastic sheets, rods, tubes, films and lay-flat tubings. Cements, pigments and miscellaneous supplies are also listed. Among data furnished are sizes, weights, color ranges, textures, specifications, grades and prices. Includes comparison tables giving chemical, electrical and mechanical properties of many plastics. Cadillac Plastic & Chemical Co.

Postage-free Reader Service Cards make it easy to order catalogs. Cards are provided on pages 235 and 236.

453 Thermoplastic Polymer — Information on the properties of Penton, thermoplastic polymer, is presented in this 6-pp brochure. Lists mechanical, electrical and chemical properties and describes molding methods. Hercules Powder Co.

DUST, FUME CONTROL

454 Dust Collectors — Operation, construction, versatility and maintenance of company's unit dust collectors are explained in this bulletin. The Kirk & Blum Mfg. Co.

455 Industrial Dust Control—A wide variety of collection methods for industrial dust control is described in 16-pp Bulletin 922. A typical case history is included as well as photos, cutaway views, drawings and capacity data. Pangborn Corp.

OTHER EQUIPMENT

456 Industrial Finishing Equipment—Catalog A 657, 12 pp, describes modern finishing system for cleaning, rust proofing, drying, painting and finish baking. The R. C. Mahon Co.

457 Preheating Combustion Air — This well-illustrated 36-pp booklet explains fuel savings and increased performance made possible by using waste heat in flue gases to preheat incoming combustion air. Also covers increased boiler output, ability to use lower grade fuels effectively. Air Preheater Corp.

458 For Cleaner Furnace—The use and application of Oxi Crystals to keep furnaces and the fireside of boilers free of slag, encrusted carbon, soot and fire-scale is described in a recent pamphlet. Oxi Corp.

459 Storage Tanks—Illustrated case histories of current applications of company's tanks and process vessels for a variety of industries are presented in this 36-pp bulletin. Advantages of design and construction are detailed. Graver Tank & Mfg. Co.

460 Water Clarification—How these flotation units achieve clarification of soluble coolants through adaptation of a basic principle of physics to a mechanical device is described in Bulletin FB-102. Advantages of the flotation units are detailed and cutaway view showing component features is included, also specifications. U.S. Hoffman Machinery Corp.

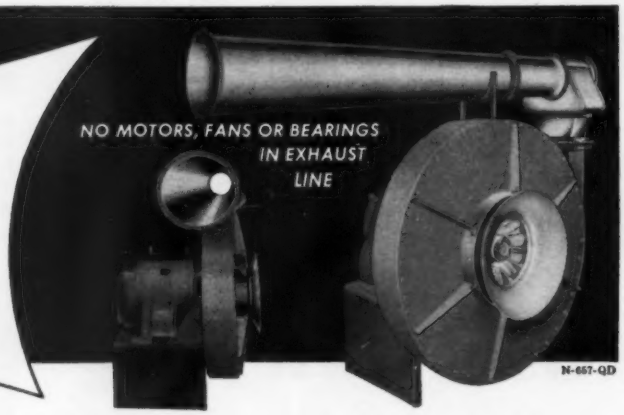
461 Industrial Equipment—Featured in this 51-pp Bulletin is a line of equipment manufactured by this company, including such items as air releases, can fillers, capacitors, circulating lubrication systems, rate of flow controllers, dispensing outfits, filters, indicators, lubricating units, meters, oilers, pumps, valves, and a variety of other products. Applications stories are included. Bowser, Inc.

462 Guide to Shelving—To assist plant engineers in selecting proper shelving for all storage requirements, 64-pp Catalog 30 offers detailed suggestions for correct shelving and storing materials, loose and packed parts, record files. Shop equipment and storage cabinets are also described, and instructions included for planning of stockrooms. Deluxe Metal Furniture Co. Royal Metal Mfg. Co.

463 Plumbing, Heating Supplies—Edition H is the current edition of this company's 126-pp general catalog

Now . . .

you can reduce bulk materials handling costs with *Quickdraft* high pressure exhausters



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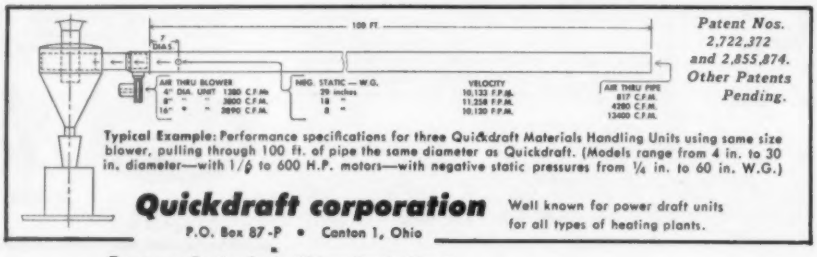
IMPORTANT NOTICE

For resisting abrasive action, Quickdraft units can be rubber lined. For withstanding corrosive gases, all Quickdraft units are available in standard acid resisting vitreous enamel, No. 316 Stainless Steel, rigid plastics (PVC), and with plastic and Fiberglas coatings.

Time and maintenance savings usually pay for Quickdraft high-pressure exhausters in 6 to 18 months on materials handling jobs. Because material does not pass through blower, maintenance is negligible. Downtime for cleaning and replacing fans, motors and bearings is eliminated. Quickdraft units are also ideal for exhausting paint spray, abrasives, corrosive gases, noxious fumes and high temperatures. For Quickdraft engineering data on materials handling, industrial exhausting, heating plant venting, write today!



Patent Nos. 2,722,372 and 2,855,874. Other Patents Pending.

Typical Example: Performance specifications for three Quickdraft Materials Handling Units using same size blower, pulling through 100 ft. of pipe the same diameter as Quickdraft. (Models range from 4 in. to 30 in. diameter—with 1/6 to 600 H.P. motors—with negative static pressures from 1/4 in. to 60 in. W.G.)

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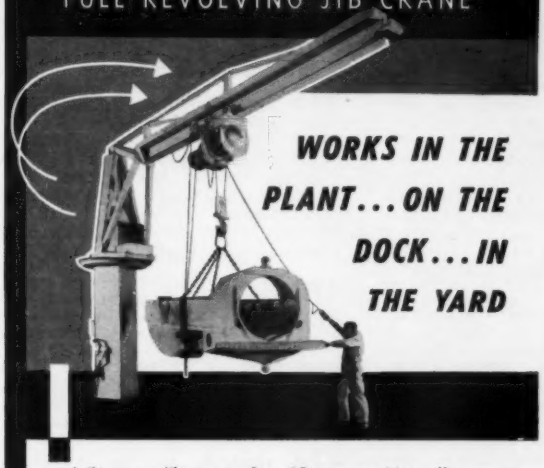

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LeTourneau jib cranes, 3 to 15-ton capacities, offer you a choice of pillar or base mounting. Install anywhere in the plant . . . on the dock . . . in the yard.

25-ft boom serves more than 1900 sq. ft. Crane itself occupies only a few sq. ft. Your choice of smooth, precise electric-powered or manual rotation. All-welded, heavy steel construction adds life, reduces maintenance time and costs.

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RUST-PROOFED . . . by zinc plating, Darnell Casters give longer, care-free life wherever water, steam and corroding chemicals are freely used.

LUBRICATION . . . all swivel and wheel bearings are factory packed with a high quality grease that "stands up" under attack by heat and water. Zerk fittings are provided for quick grease-gun lubrication.

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R&M®

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Cutaway shows design features of the Sky-Blast

Free-Flow SKY-BLAST® Roof Ventilators are *WEATHERPROOF!*

Even if the rain comes down in buckets, there's no need for weather covers on SKY-BLAST roof ventilators. In operation, the powerful airstream keeps out snow, rain and sleet. At rest, butterfly dampers form a water-tight seal, won't leak a drop. With no interfering covers, more air is moved at less cost. Fumes are thrown high in the air to prevent re-entry into the building and to eliminate roof maintenance problems created by other types of ventilators. Wind velocity or direction can't affect performance. Heavy gage steel surfaces are hot-dip galvanized for real sou'wester protection. With patented, non-clogging rainshed, low wind guard, rugged base and condensate drain, it's always fair weather beneath a SKY-BLAST. Wind tunnel proven ratings to 78,000 cfm. Send for bulletin 680—PE

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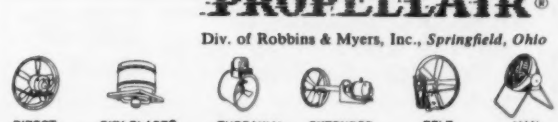

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DATA FILE

(Begins on page 240)

on plumbing and heating repair parts, tools and accessories. Indexed and illustrated, the catalog gives detailed information on uses. J. A. Sexauer Mfg. Co., Inc.

464 **Water-Cooled Stoker** — Design and operating advantages of the Vibra-grate Stoker are outlined in this illustrated bulletin. A large cutaway view details component parts of the stoker. American Engineering Co.

465 **Oilers and Safety Cans**—Catalog 55-C covers company's complete line of oilers and oil and gasoline containers. Photos and drawings, as well as specification data and prices are included, and replacement parts are identified and pictured. An attached analysis sheet furnishes descriptive data. Eagle Mfg. Co.

466 **Padlocks**—Catalog 56, 20 pp, features descriptions of padlocks to meet every need, with actual size illustrations of entire line. Special long shackle padlocks are included, as well as super security padlocks which have an extra short shackle clearance of only ½ in. Master Lock Co.

467 **Cyclone Separators**—Featured in 8-pp Bulletin 712 are company's cyclone separators and pipe line after-coolers designed to provide cool, dry and clean compressed air and gases. Cutaway views illustrate component parts and features, and capacity tables facilitate selection. R. P. Adams Co., Inc.

468 **Air Pollution Control** — Featured in this 8-pp bulletin are solutions to air pollution control and heat recovery through catalytic oxidation. Typical problems and solutions in organic finishing and drying, chemical industry, oil refinery industry, and food processing industry are detailed, and package catalyst units for all types of applications are described. Oxy-Catalyst, Inc.

469 **Air Conditioning Units**—Bulletin 786 contains 54 pp of selection data on air conditioners, including capacities, standard arrangements, dimensions, etc. Steps in selection of basic unit and components are outlined. First pages are devoted to choosing the physical size based on air capacity and face velocity requirements, while succeeding pages concern themselves with heating and cooling requirements, control. American Air Filter Co., Inc.

470 **Corrosion Control** — Process Bulletin B6 discusses causes of condensate system corrosion and methods of corrosion control in steam condensate systems. Condensate corrosion inhibitors are illustrated and described. National Aluminate Corp.

471 **No-Frost Refrigeration**—Twelve-pp Bulletin 105 describes with diagrams and photos method used for food freezing, chilling and warehouse refrigeration without frost or ice formation. Advantages given. Niagara Blower Co.

472 **Reproduction Materials**—Photographic papers and films designed for improving drawing and document reproduction are featured in 22-pp Bulletin FI-232. Helpful techniques and economies which these reproduction materials are making possible in drafting room and reproduction department told. Eastman Kodak Co.

473 **Magnetic Equipment**—Product and application information on a line of magnetic separators, magnetic automation units, and vibratory equipment is presented in 47-pp pocket-size Booklet B-575. Descriptive information and photos of typical installations. Eriez Mfg. Co.

474 **Draft Starter** — Capacity data for Quickdraft units are presented in 8-pp Form QF-SD. Seven capacity tables provide means for determining capacity of standard units when installed under hundreds of different conditions. Quickdraft Co.

475 **Tripod Elevated Tank** — This illustrated bulletin describes the Horton tripod elevated water tank, designed to provide economical gravity water pressure for general service and fire protection in private water systems, others. Standard sizes included. Chicago Bridge & Iron Co.

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The easiest—and quickest—way to order bulletins and catalogs described in this magazine is to use the postage-free Reader Service Cards on pages 235-236.

All you need to do is circle the item numbers of those you want. Then fill in your name, job title, company name and address—and mail the card.

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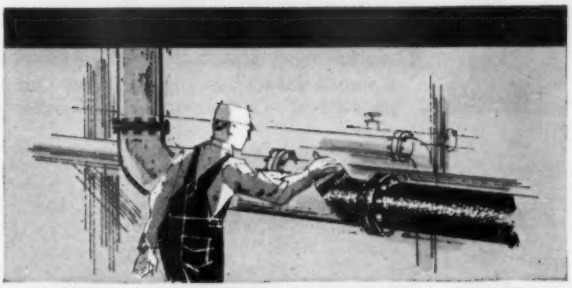
END ALL DRIP AND RUST PROBLEMS IN YOUR PLANT THESE TWO PROVEN WAYS!

Industrial plants know Mortell products offer more positive protection than any other drip-and-rust preventive. Maintenance men know that paints or compounds of paint and fish oil provide little or no permanent protection. Rust-inhibiting NoDrip Plastic Coating is a moisture-proof insulation that *does* stop condensation . . . forms a seamless jacket . . . *does* stop corrosion. NoDrip Tape, with its triple insulating barrier, is equally dependable.



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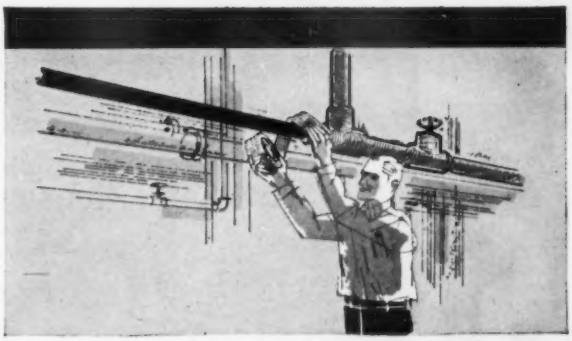
The heavy consistency of NoDrip outlasts many coats of paint or ordinary rust-preventives. Permanently insulates and protects. Applies easily with trowel, brush or special spray. Nontoxic, odorless and non-flammable. Resists acid, alkali, brine solutions or vapors. Available in 1, 5 and 55 gallon drums.



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An easy-to-use, wrap-around pipe covering, perfectly pliable, cork-filled, completely self-adhering. Forms an air-tight, 100% vapor- and moisture-proof jacket. Fits snugly even around tees, unions, angles, valves. Cuts maintenance costs—makes out-of-the-way storage areas useable—ends slip and slide floor hazards. No need for vapor seals, brads, fasteners or tools of any kind.

At all leading hardware, mill supply and plumbing jobbers. For complete information and technical handbook, write

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ANCOR FLOOR PLATES BY WHEELING

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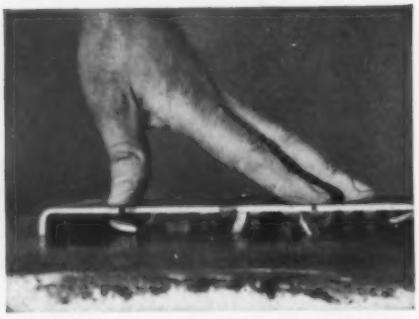
Remove loose flooring material and pour a 1½" to 2" layer of fresh concrete.

2



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3

Let concrete harden around the 53 steel anchors on each plate. Floor's ready!

3 steps to a permanent steel floor

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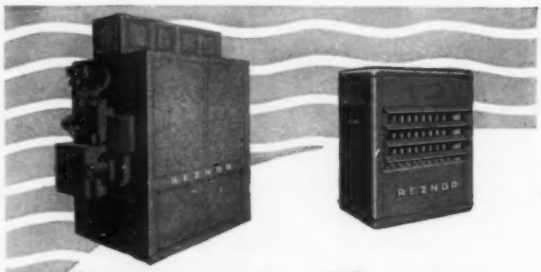

eliminate trouble spots

No matter how good your plant heating system may be, you probably have a few heating "trouble" spots which it just can't handle. Areas around big shipping room doors, offices where higher temperatures are required to maintain comfort, and distant drafty corners which are beyond the effective reach of a central heating system create common plant heating problems.

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Look for Reznor under "Heaters-Unit" in the Yellow Pages

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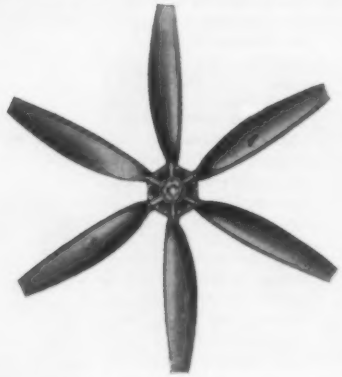
A lot of HOT AIR?

Yes!... half a million cubic feet of it a minute exhausted over glass furnaces by these Hartzell fans



Adjustable pitch fans are cast of corrosion resistant aluminum alloy. Blade pitch adjustment to change air delivery requires simply loosening two bolts. Available in eleven sizes from 40" to 132" — in 3, 4 and 6 blade assemblies.

The exceptionally high air temperature over the glass furnaces in a plant located in New Jersey posed a rather unusual problem for Hartzell engineers. An enormous quantity of 160° air had to be moved very rapidly. The solution was six (two are located on opposite side of monitor) Hartzell 6 bladed 85" fans, each driven by a class "B" insulated 10 H.P. motor — each moving air at 83,000 CFM. High temperature fan belts are used to reduce fan speed to 385 RPM. Motors are all located outside the building, and in such a position that they can be serviced from the roof.

This installation is one of the more unusual ventilation problems that have come up. It points out, however, that each ventilation problem is different — each must be carefully engineered to obtain satisfactory results. Hartzell engineers take pride in having "know-how" to handle any air moving problem. And Hartzell takes equal pride in manufacturing top quality ventilating equipment — both fans and ventilators.

If you have a plant ventilating problem get in touch now with your nearby Hartzell field office. If you don't know where to find it, a note will bring the information at once.

This installation was handled by the Hartzell field office at 333 Arch Street, Camden, New Jersey; phone WOodlawn 4-5256.

here's a complete line of air moving equipment designed and built specifically for industry

Other famous Hartzell products include controllable and full feathering propellers for light aircraft, crop drying equipment and farm ventilating fans.

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YOU PAY FOR OVERLOAD PROTECTION

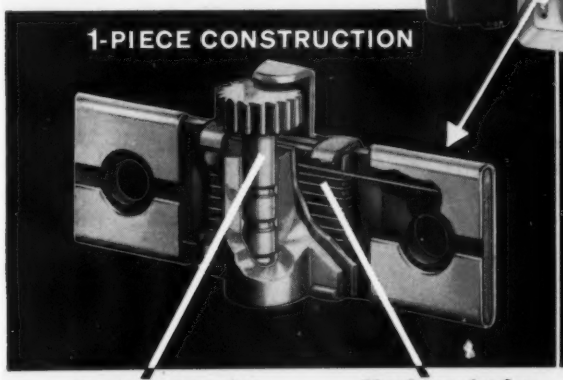
Only ONE-PIECE Overload Relays give 100% Protection • Only with ONE-PIECE construction can you *know* you've installed the heater correctly. Only with ONE-PIECE construction can you *know* the heater is exactly centered, or properly positioned, so that it performs according to its rating. Only with ONE-PIECE construction can you *know* your motors have full protection.

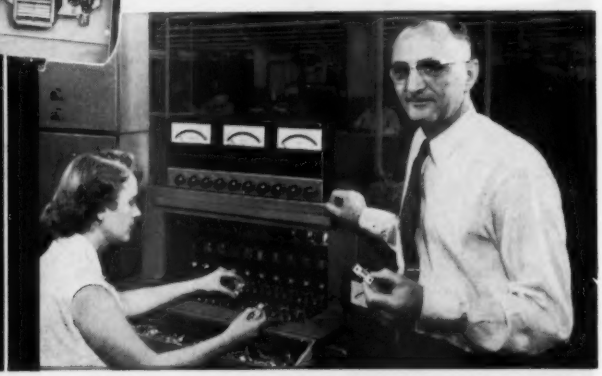
Only Square D has ONE-PIECE Construction • ONE-PIECE construction *eliminates* any possibility of heater misalignment. Square D melting alloy thermal overload relays can be installed only one way. They are tamper-proof. They are factory-assembled, are *individually* calibrated and tested. Repeated tripping will not affect accuracy

Insist on Square D melting alloy thermal overload relays

***Write** for Bulletin SM-275 for the complete story on Square D starters with ONE-PIECE thermal overload relays. Address Square D Company, 4041 N. Richards St., Milwaukee 12, Wisconsin.*

...BE SURE YOU GET IT!





Heat-responsive element (solder pot) provides accurate response to overload, yet prevents nuisance tripping.

Heat-producing element is an integral part of overload unit. It's permanently joined to solder pot, can't become misaligned.

Individual factory inspection of every Square D melting alloy thermal overload relay means performance you can trust. Each unit is calibrated and thoroughly tested to make sure it will perform according to its rating.

EC&M HEAVY INDUSTRY ELECTRICAL EQUIPMENT...NOW A PART OF THE SQUARE D LINE

SQUARE D COMPANY

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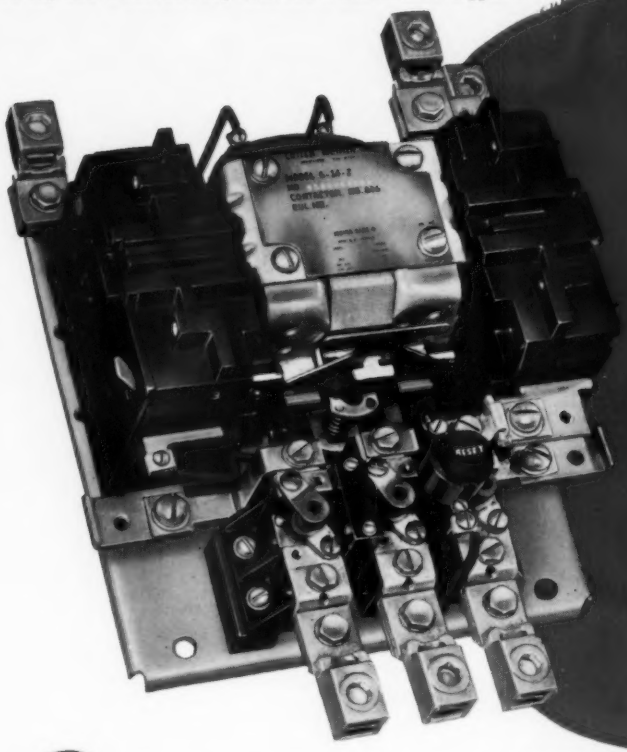
50 Hp 220 Volts, 100 Hp 440/550 Volts Max. Polyphase



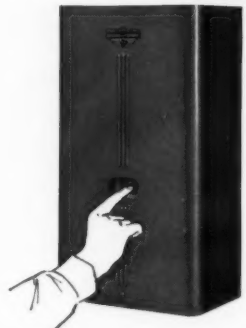
New SIZE 4 STARTER

. . . another Cutler-Hammer Three-Star achievement

New *compact design saves valuable panel area*

New *parallel contact design provides increased electrical life at full capacity*

New *low mass movable members insure superior mechanical life*



This is the new Cutler-Hammer NEMA Size 4 Starter . . . industry's first large horsepower starter offering all the desired features of the famous Cutler-Hammer Three-Star Motor Control line. Smaller, more compact, this new starter simplifies control panel design and saves valuable panel area. Tests of the new parallel contact structure show vastly improved electrical life even when operated at full capacity. Further, this new design reduces the size and weight of the movable members resulting in less impact wear and unsurpassed mechanical life. We've tested it against all others, why don't you? The new Cutler-Hammer Size 4 Starter ☆ installs easier, ☆ works better, ☆ and lasts far longer. Get all the facts today. Write for the new descriptive bulletin EN125-J274, Cutler-Hammer Inc., Milwaukee 1, Wisconsin.

Look for these outstanding features . . . you'll find them only in Cutler-Hammer Three-Star Motor Control

- U-shaped cover easily removable for unobstructed inspection and accessibility
- Straight through wiring . . . line terminals at the top, load terminals at the bottom
- New pressure type terminals cut wiring time and effort
- Adjustable overload relays can be set to trip within 3% of full load motor current
- Precision cast overload sensing coils can't lose their accuracy
- Widely desired three-phase, three-coil overload protection is a standard optional feature . . . no special attachments or enclosures
- Indestructible molded magnet coil . . . color coded for positive voltage and frequency identification
- Easily installed convertible electrical interlocks require no special adapters . . . provide up to four extra control circuits
- Available as non-reversing, reversing, and multi-speed contactors and starters in the open type, NEMA 1, and all special purpose enclosures.

CUTLER-HAMMER CONTROL C-H

CUTLER-HAMMER

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JUNE, 1959

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The magazine that helps plant engineers with their everyday problems

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